

Dynamic Multi-Modality Fused Imaging, Analysis, Computer Aided Diagnosis System

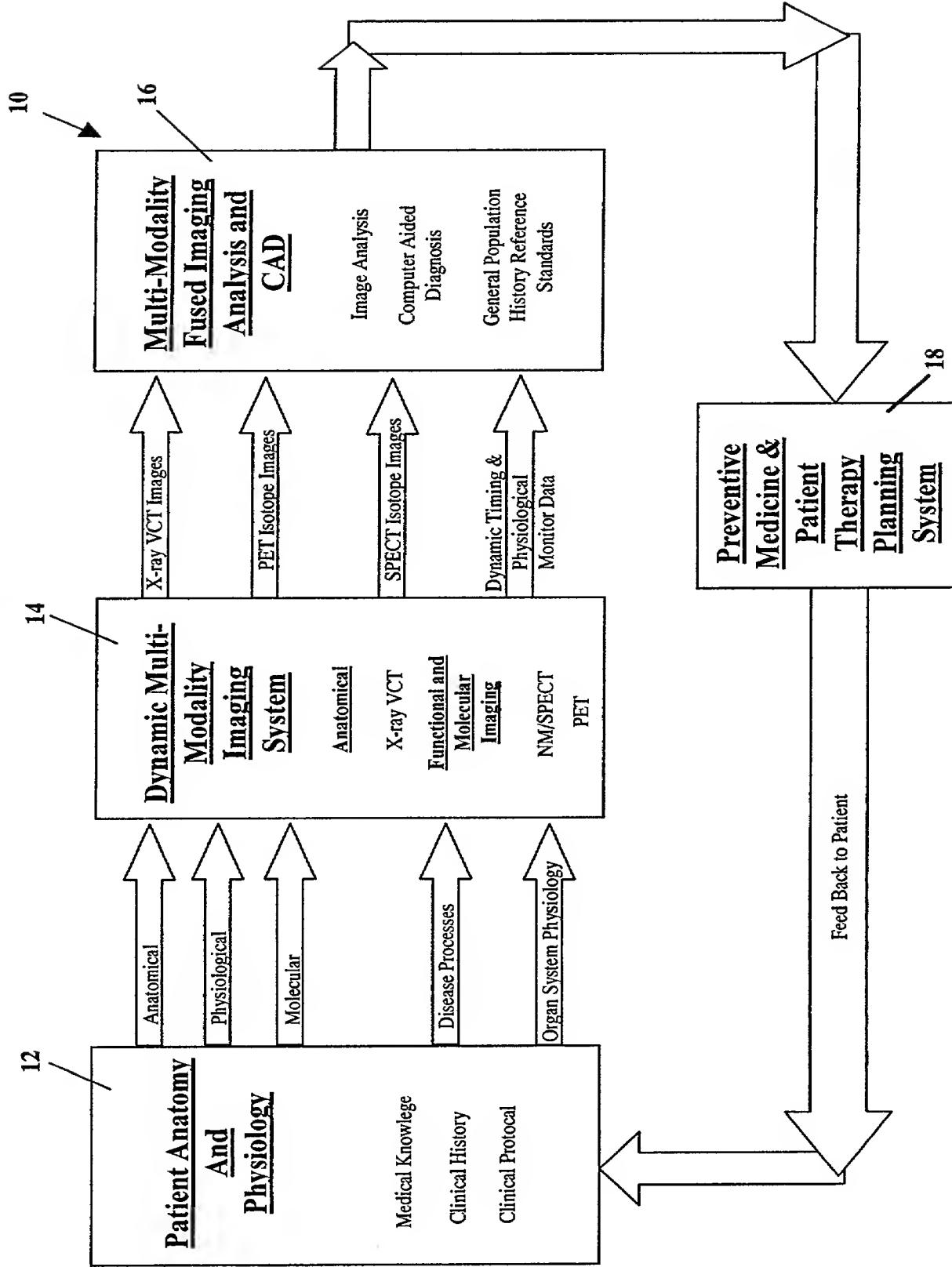


Figure 1

Multi-Modality Imaging System with Common Focused 2D Curved Detector

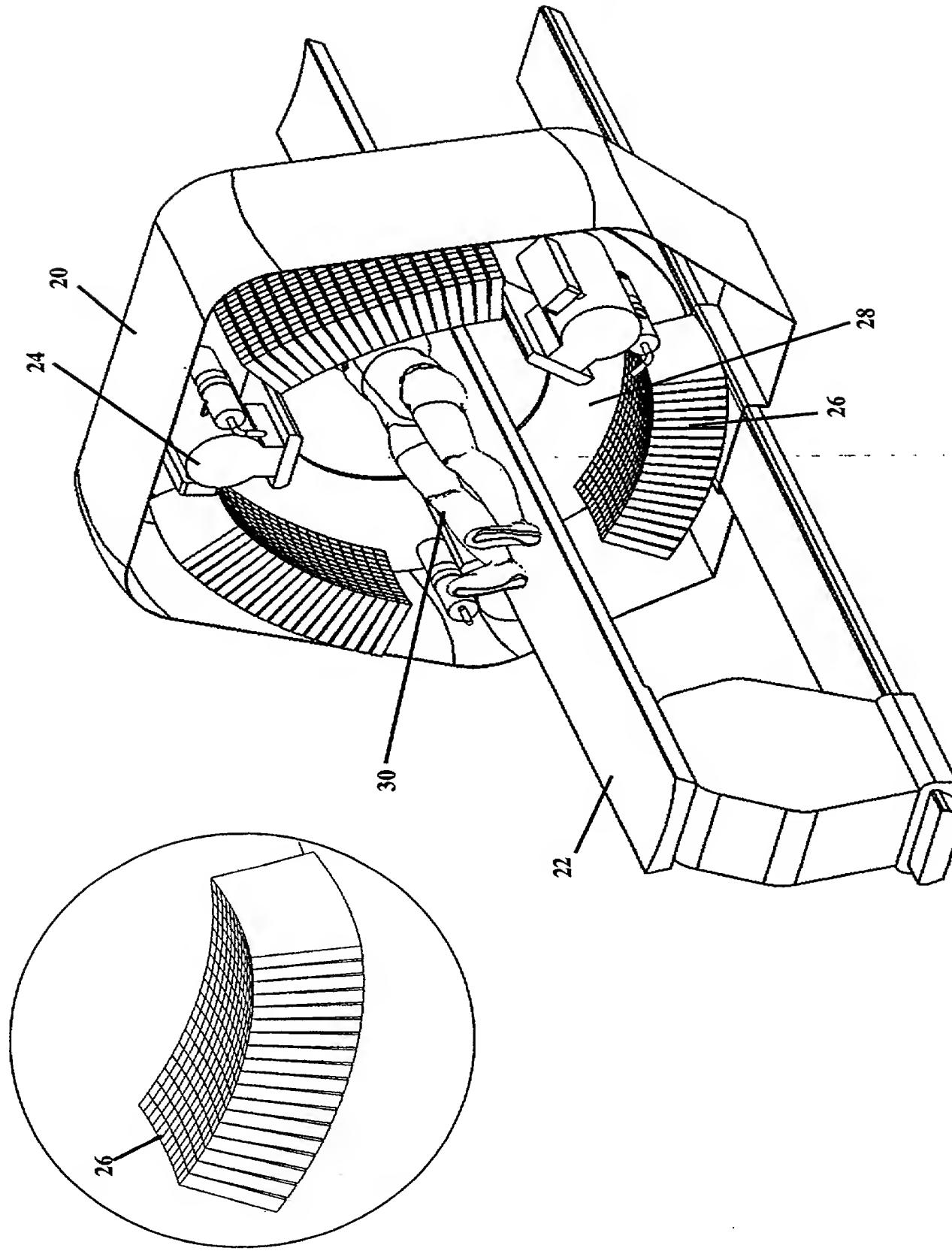


Figure 2

Overall Multi-Modality Imaging System Block Diagram

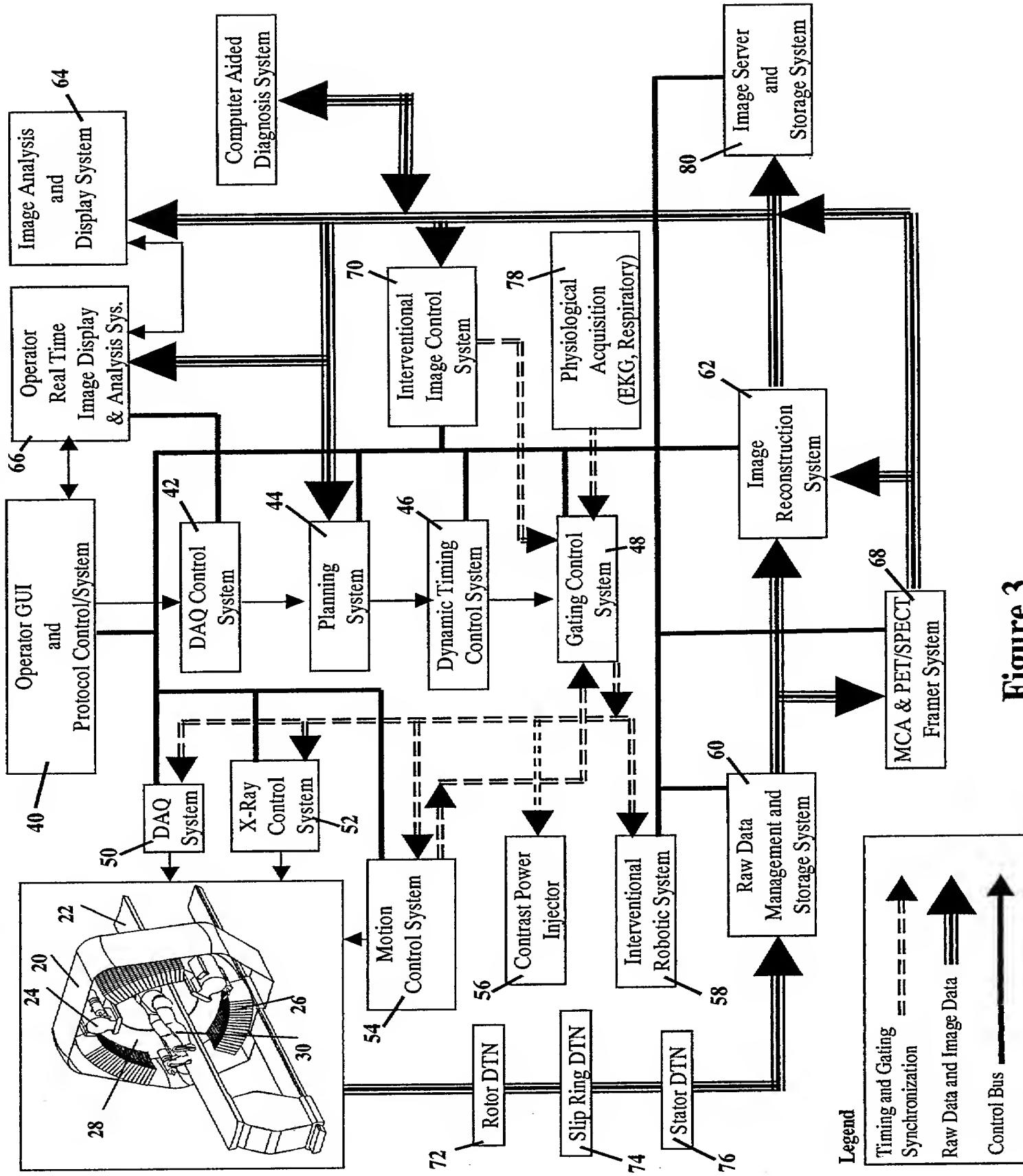


Figure 3

X-ray & Focused 2D Curved Detector Arrangement

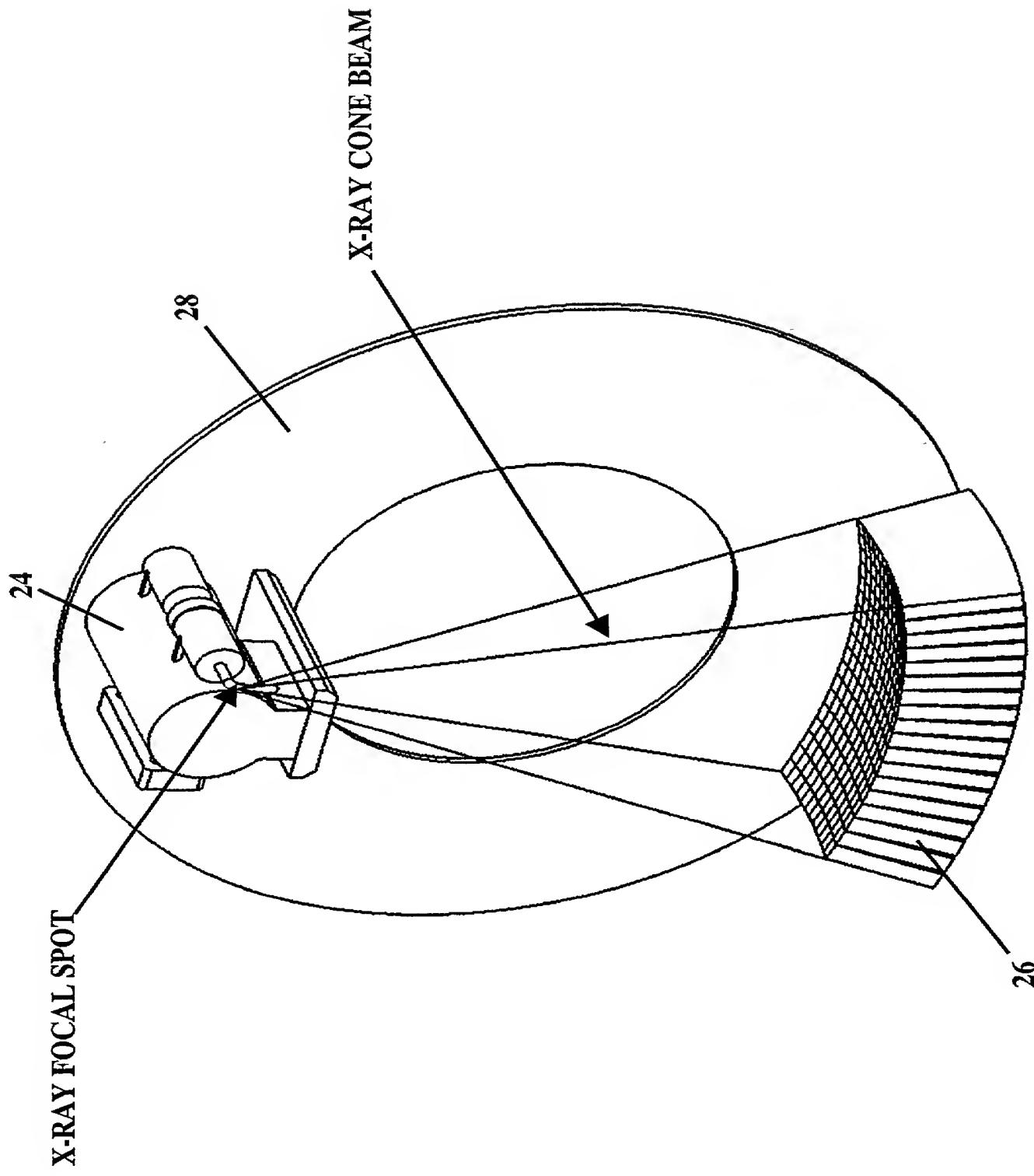


Figure 4

Cone Beam Source Collimation & Cone Beam Shaped Filter

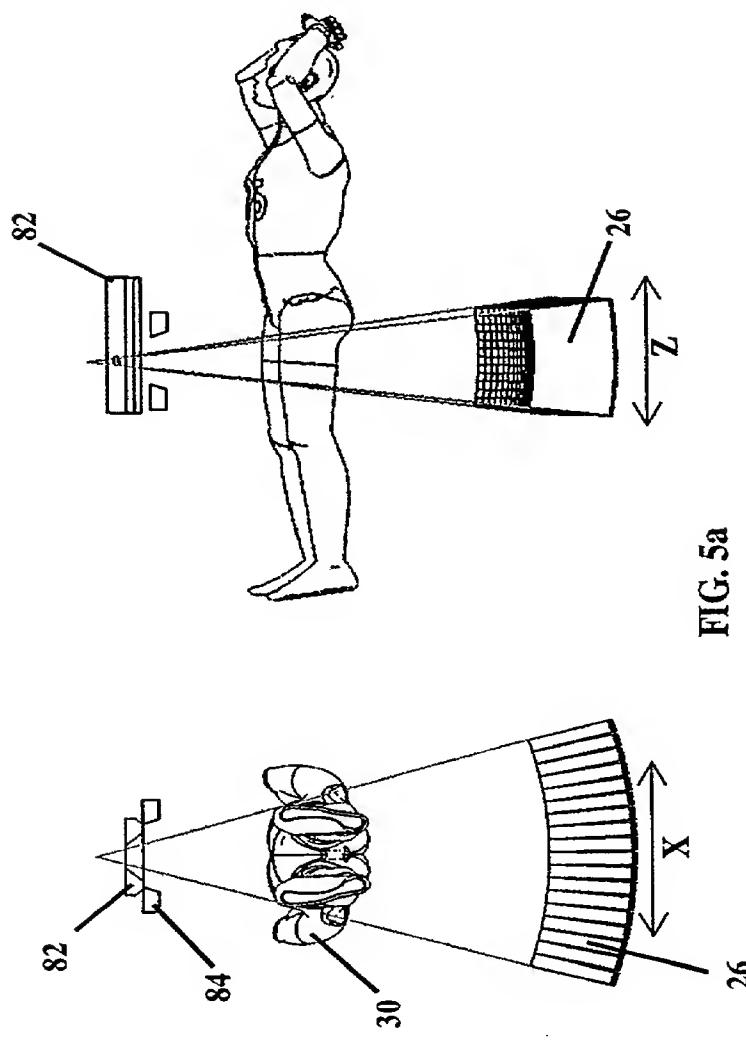


FIG. 5a

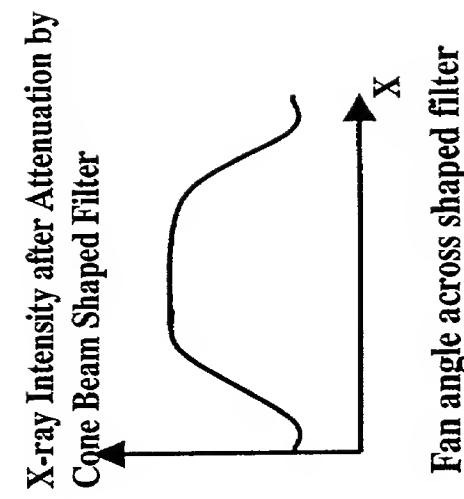


FIG. 5b

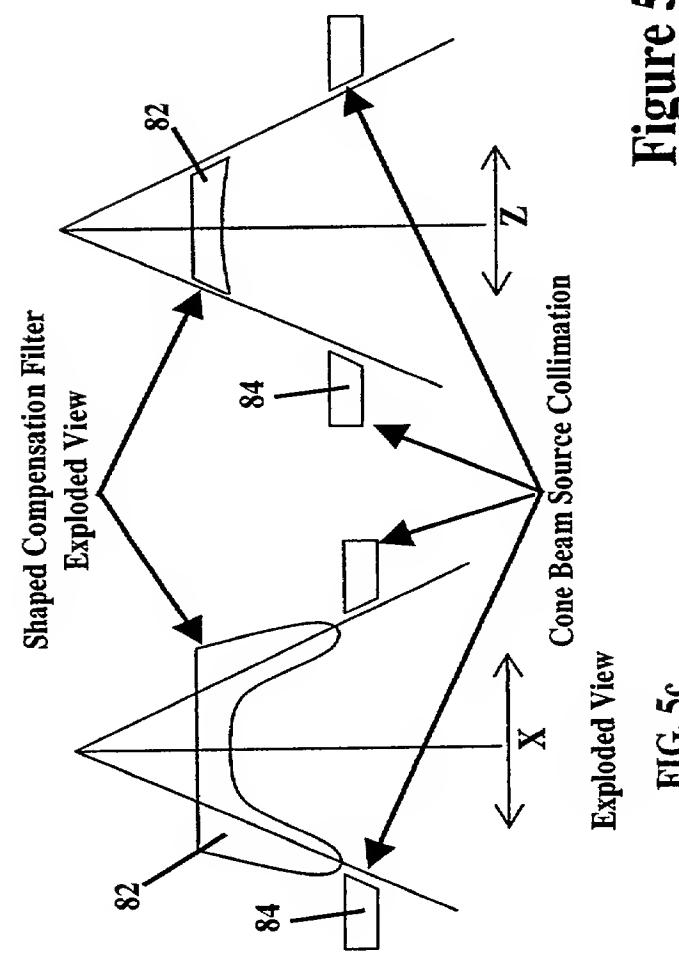


FIG. 5c

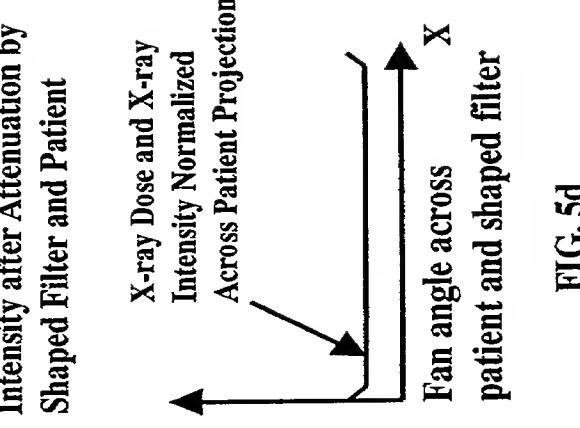
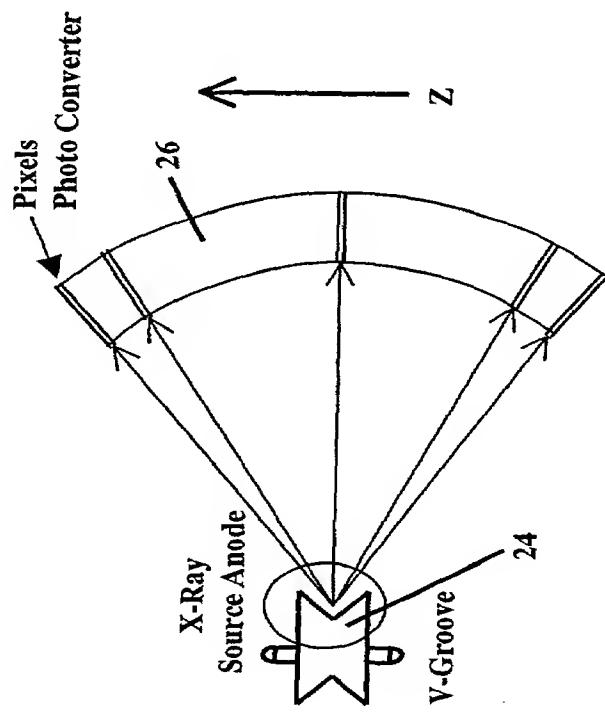


FIG. 5d

Figure 5

X-ray Cone Beam Focal Spot - Curved Detector Optics

Curved Detector to reduce spatial resolution loss and Best Conversion efficiency of X-ray



Focal spot from V-groove Type Anode has similar spot size appearance

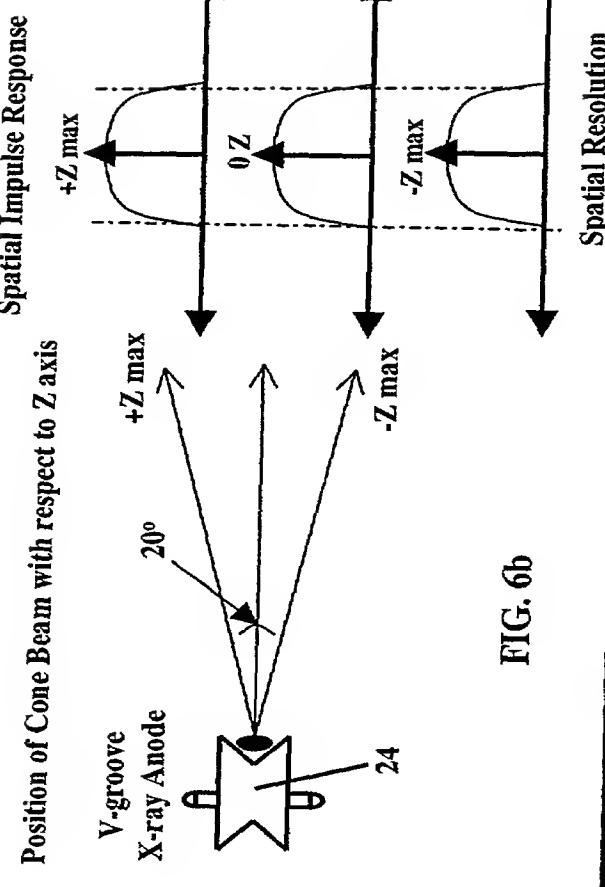


FIG. 6b

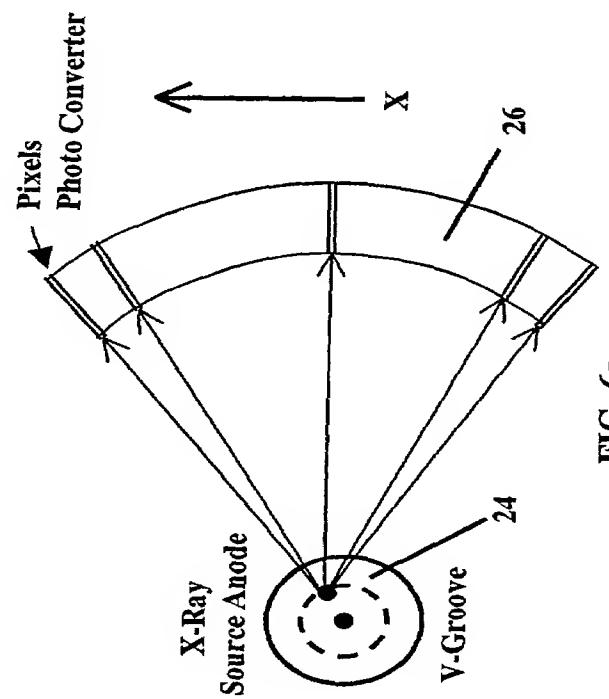


FIG. 6a

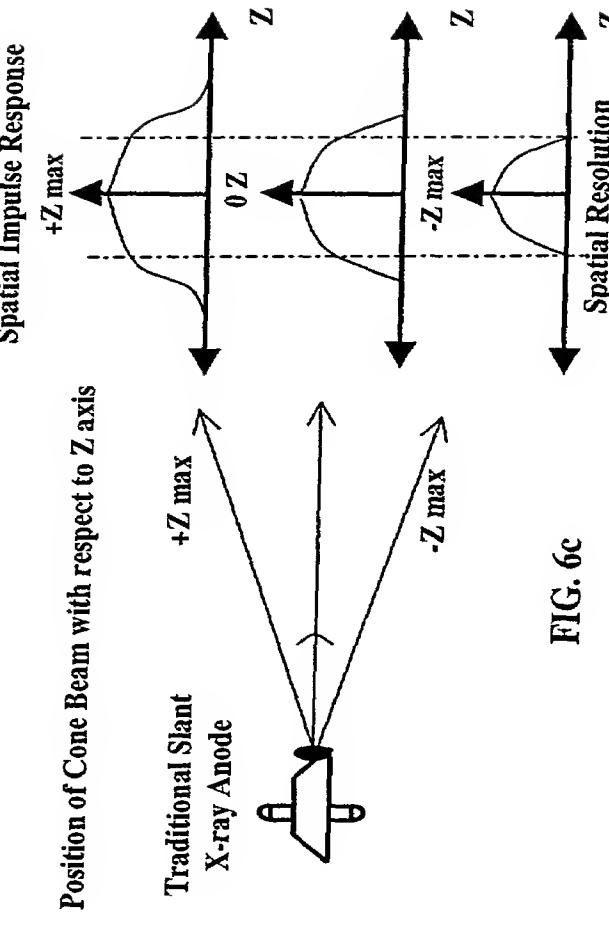


FIG. 6c

Figure 6

2 Dimensional Focal Spot Dithering for Improved Cone Beam

Spatial Resolution

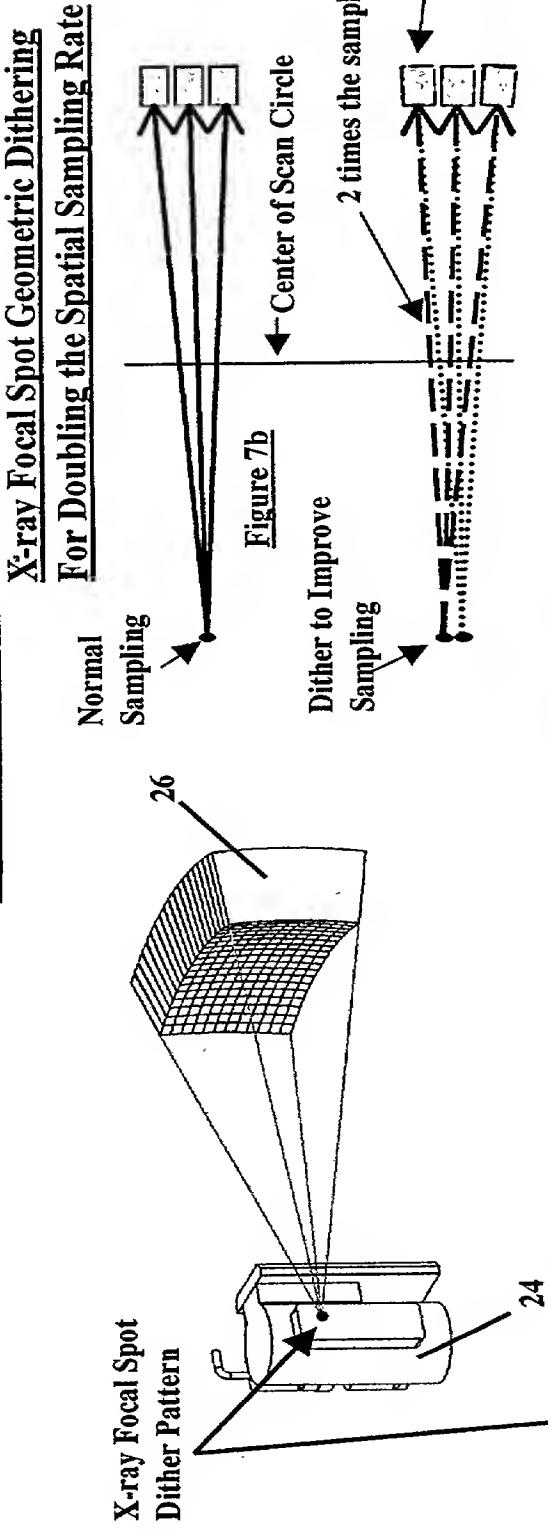


Figure 7a

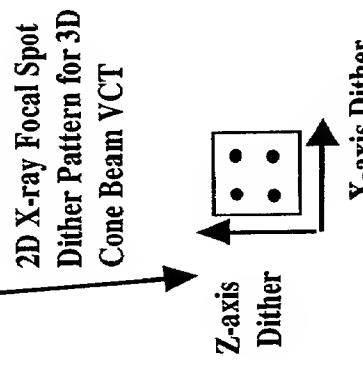
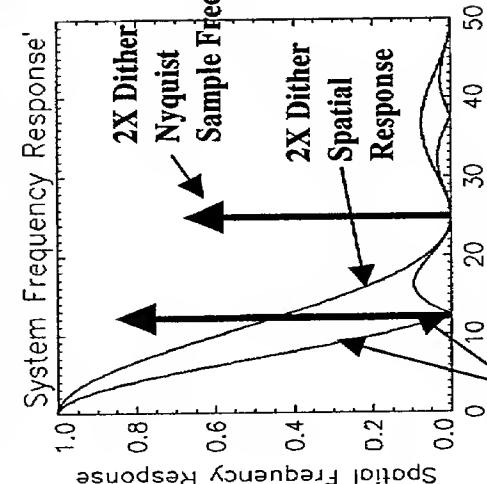


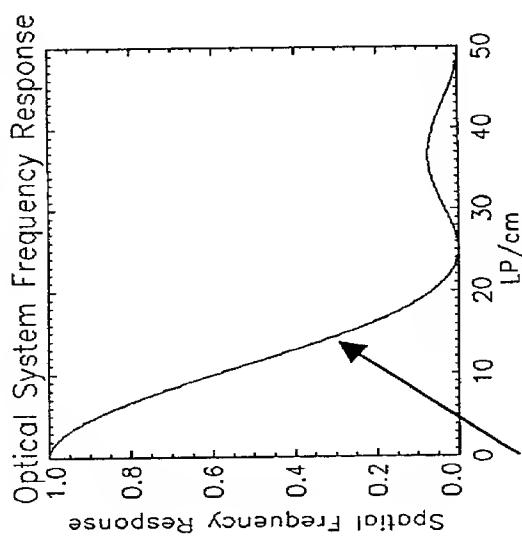
Figure 7b

Spatial Resolution comparison between Single Sampling and 2X Dither Sampling



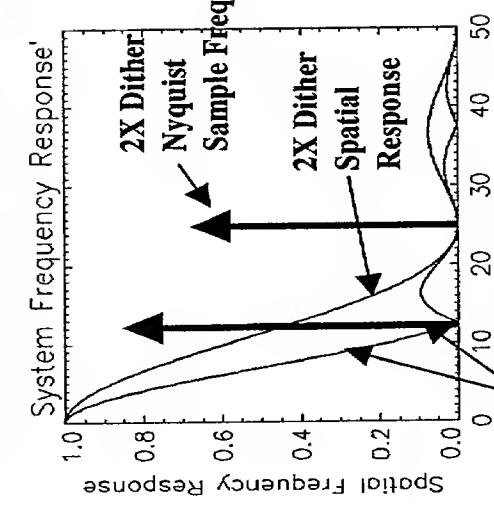
Normal Nyquist Sample Freq. & aliased optical response

Figure 7



X-ray Optical System Response before Sampling

Figure 7e

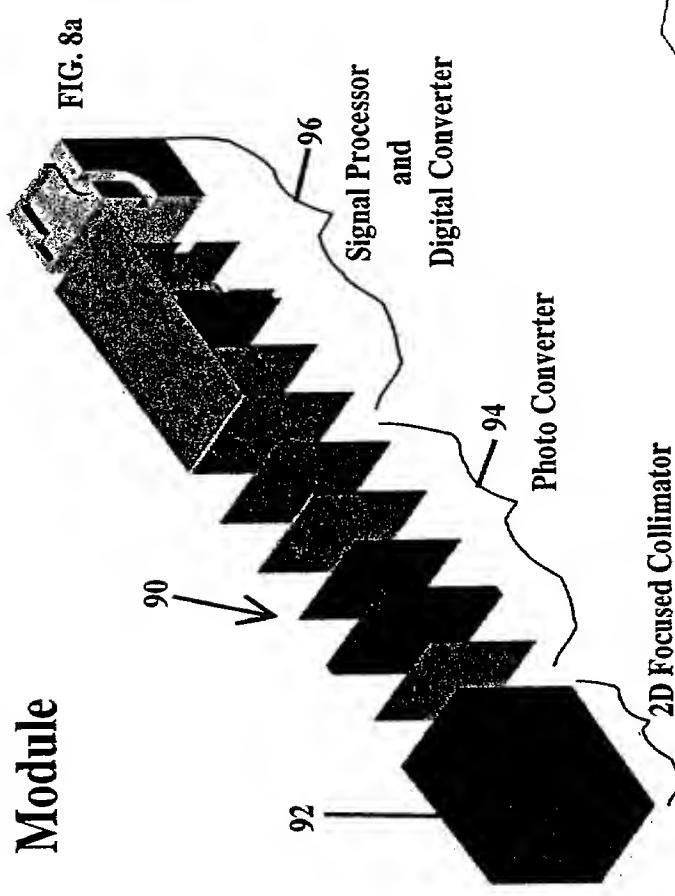


Normal Nyquist Sample Freq. & aliased optical response

Figure 7f

Focused 2D Curved Detector Module

Focused Curved Detector Module



View Showing Focused 2D Anti-scatter Collimation with 2D Focused Pixels

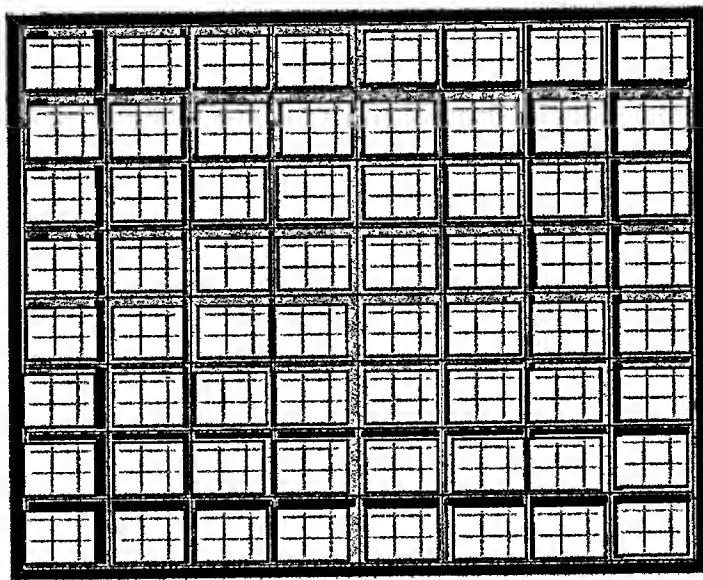
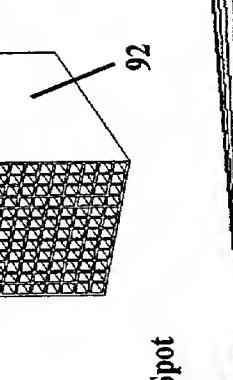
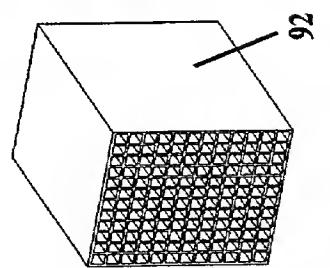
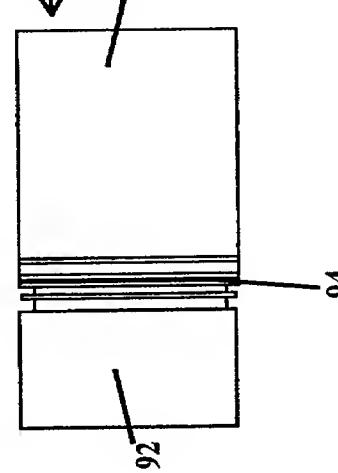


FIG. 8a

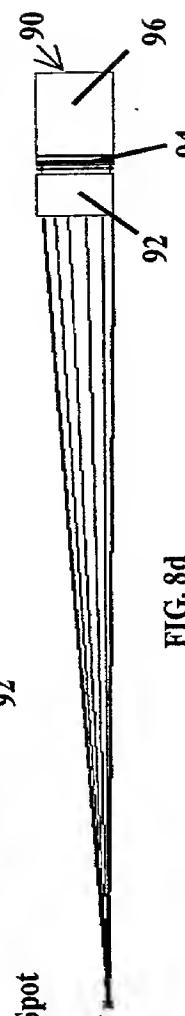


X-ray Focal Spot



92
90
94

FIG. 8c



90
92
94

FIG. 8d

FIG. 8b

Figure 8

Focused 2D Area Detector with Adaptive Shaped X-Ray Optical Response

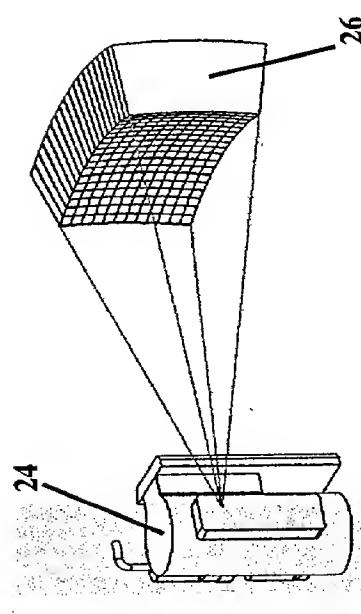
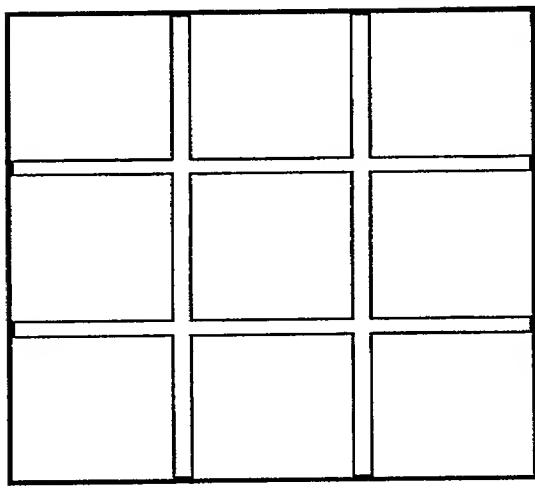


FIG. 9a

Impulse Response Shaping from Rectangular to
Variable gaussian Roll-off Function.
Shaping may be Fixed or Controlled



Detector Pixel
FIG. 9b

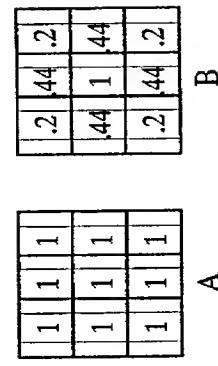
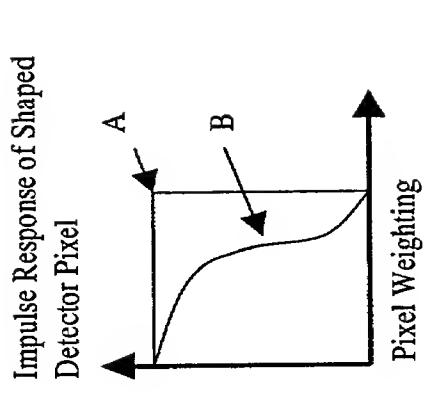


FIG. 9c

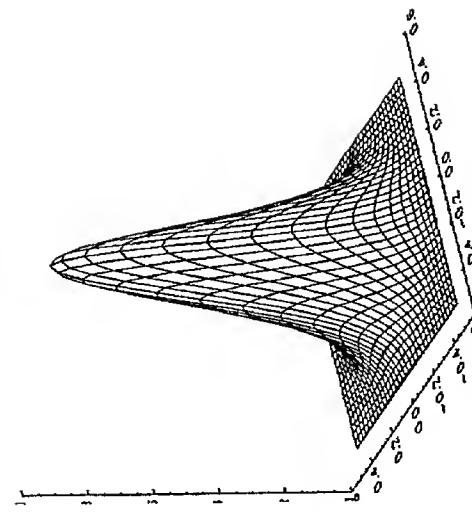


FIG. 9d

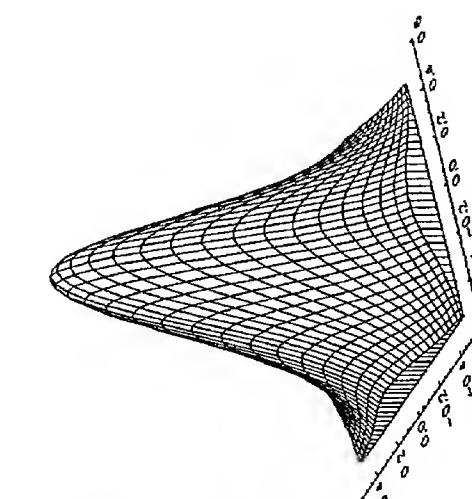


FIG. 9e

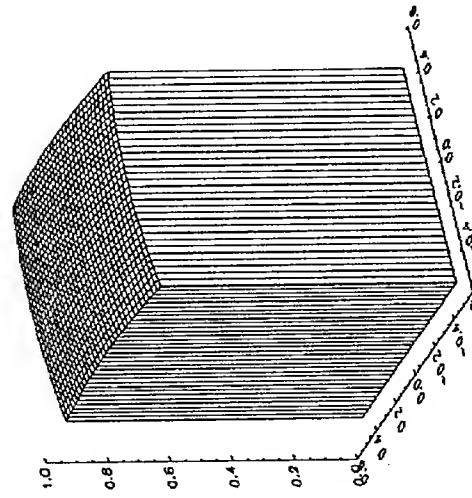


FIG. 9f

Figure 9

Multi-Modality XGA Detector Module

X-Ray Mode

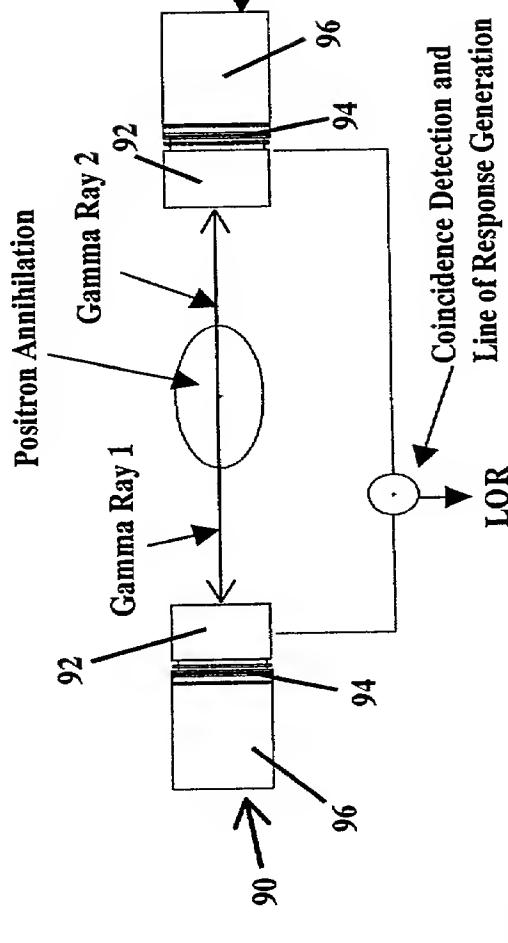
FIG. 10a

X-ray Focal Spot



PET Mode

FIG. 10b



NM/SPECT Mode

FIG. 10c

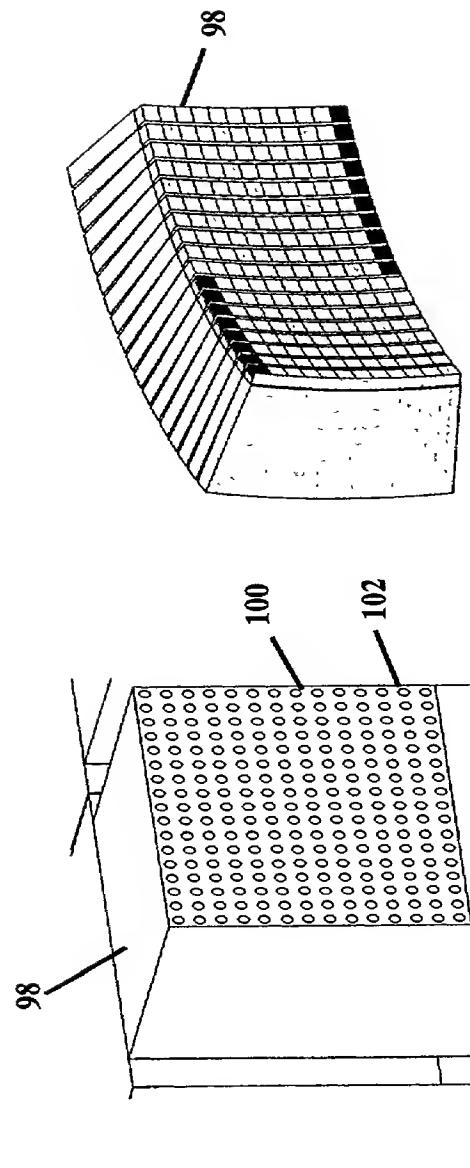


Figure 10

Detector Module Multi-Modality Collimation

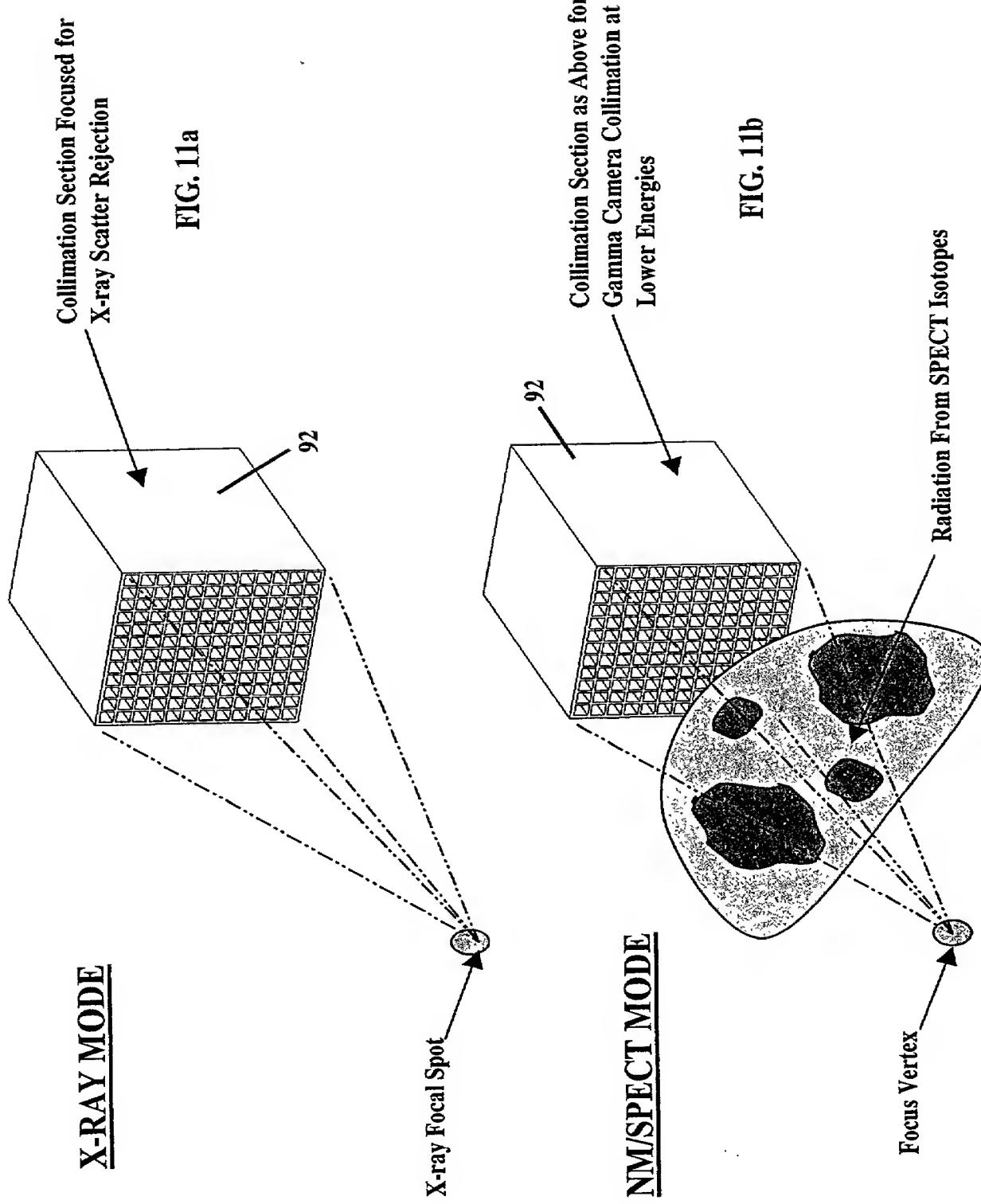


FIG. 11a

FIG. 11b

Figure 11

XGA Detector Module Signal Processing

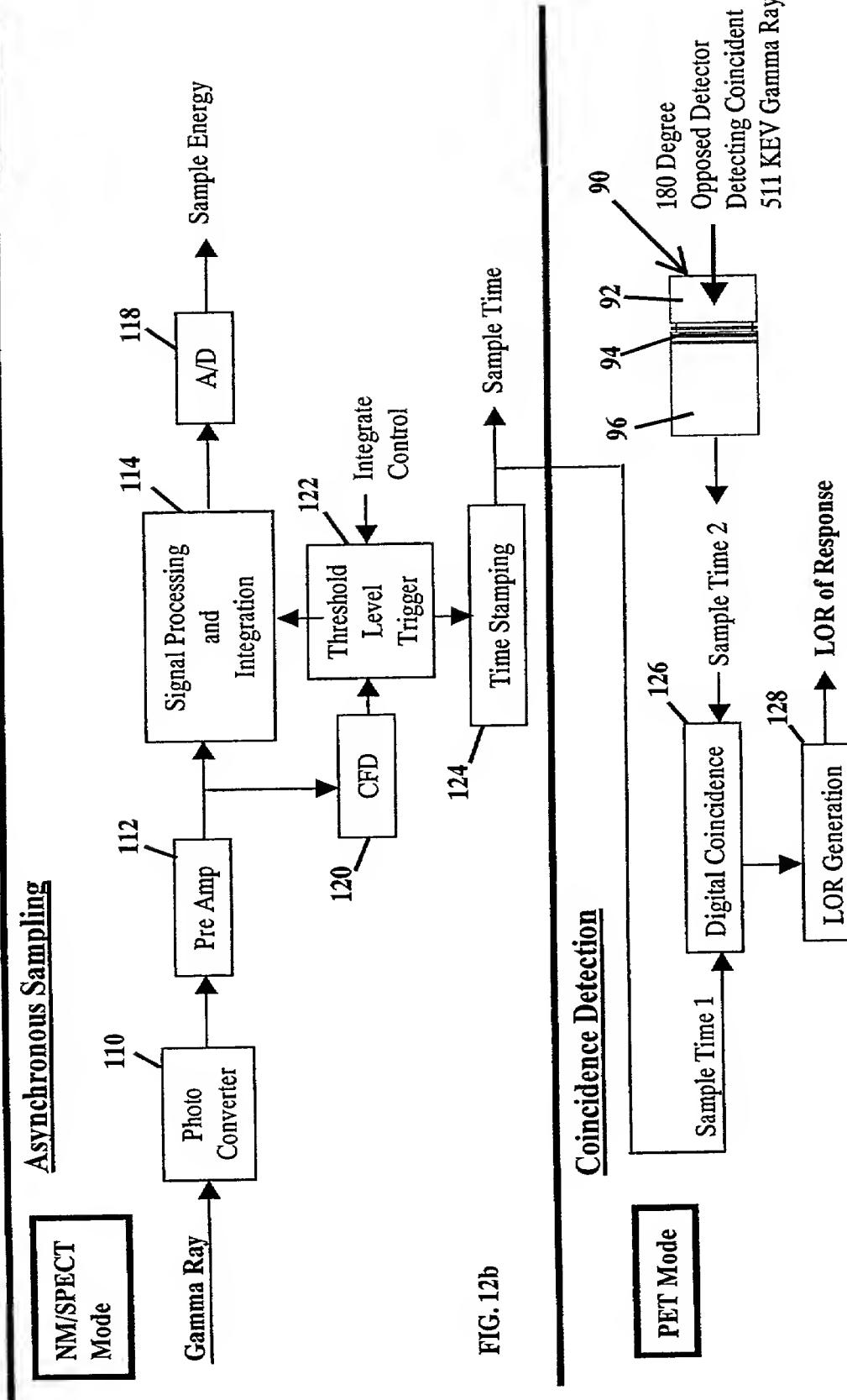
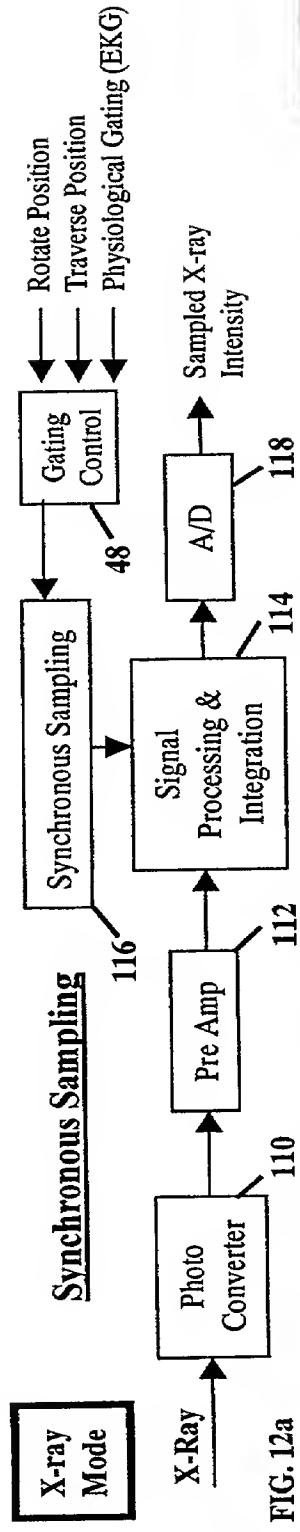


Figure 12

System with Optional PET Anti-Scatter Baffle

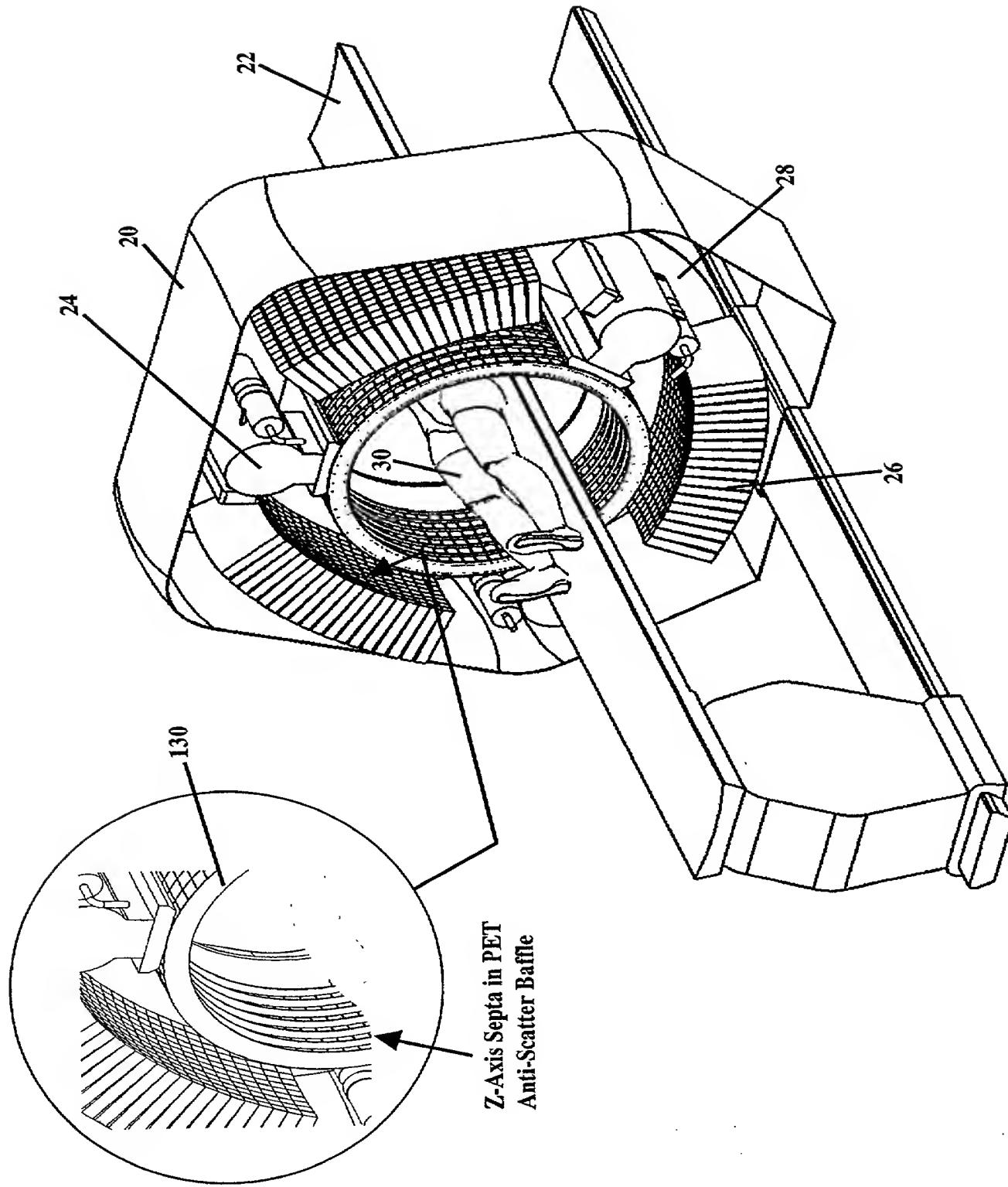


Figure 13

PET – Anti-Scatter Baffle SEPTA

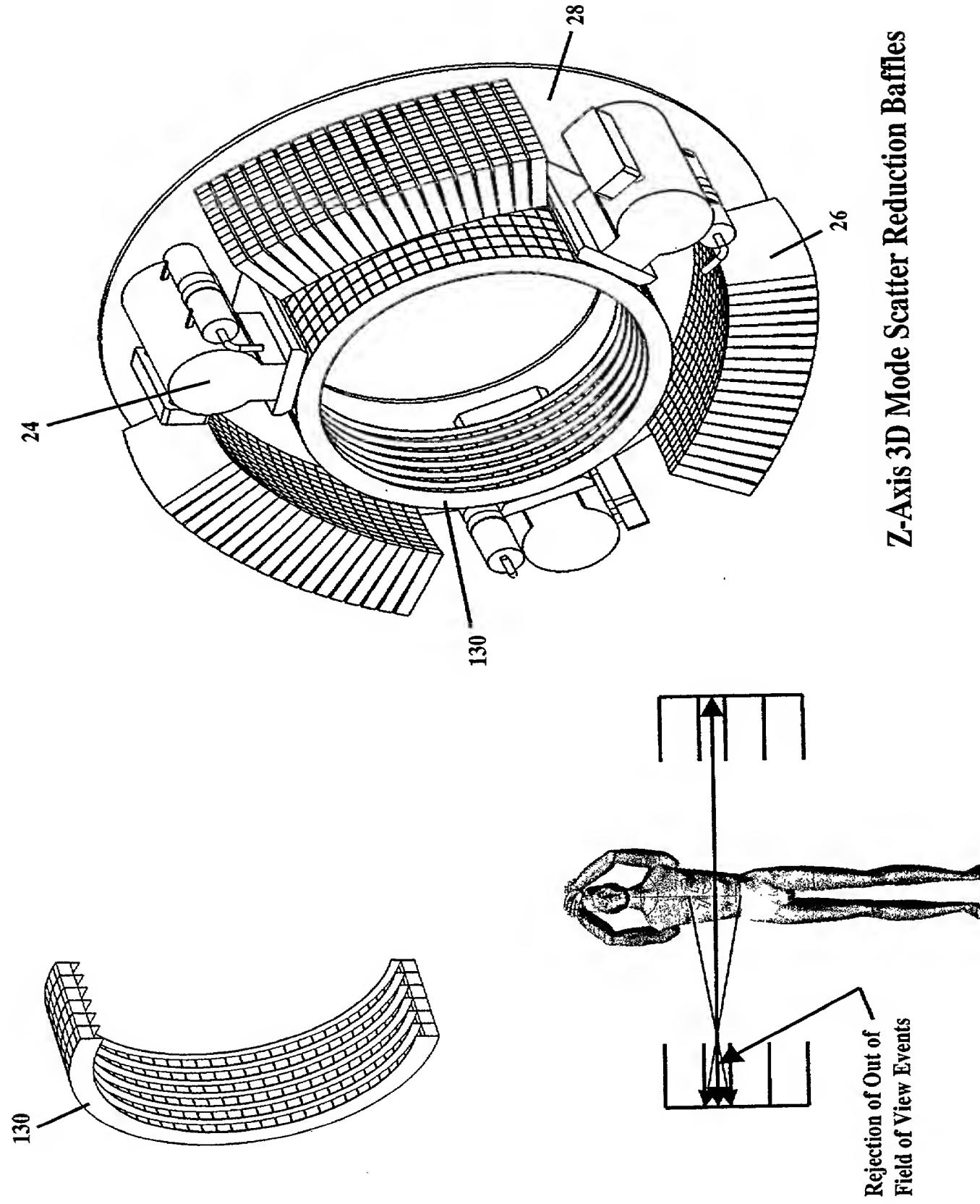


Figure 14

Z-Axis 3D Mode Scatter Reduction Baffles

System With Cone Beam Focused NM/SPECT Collimation

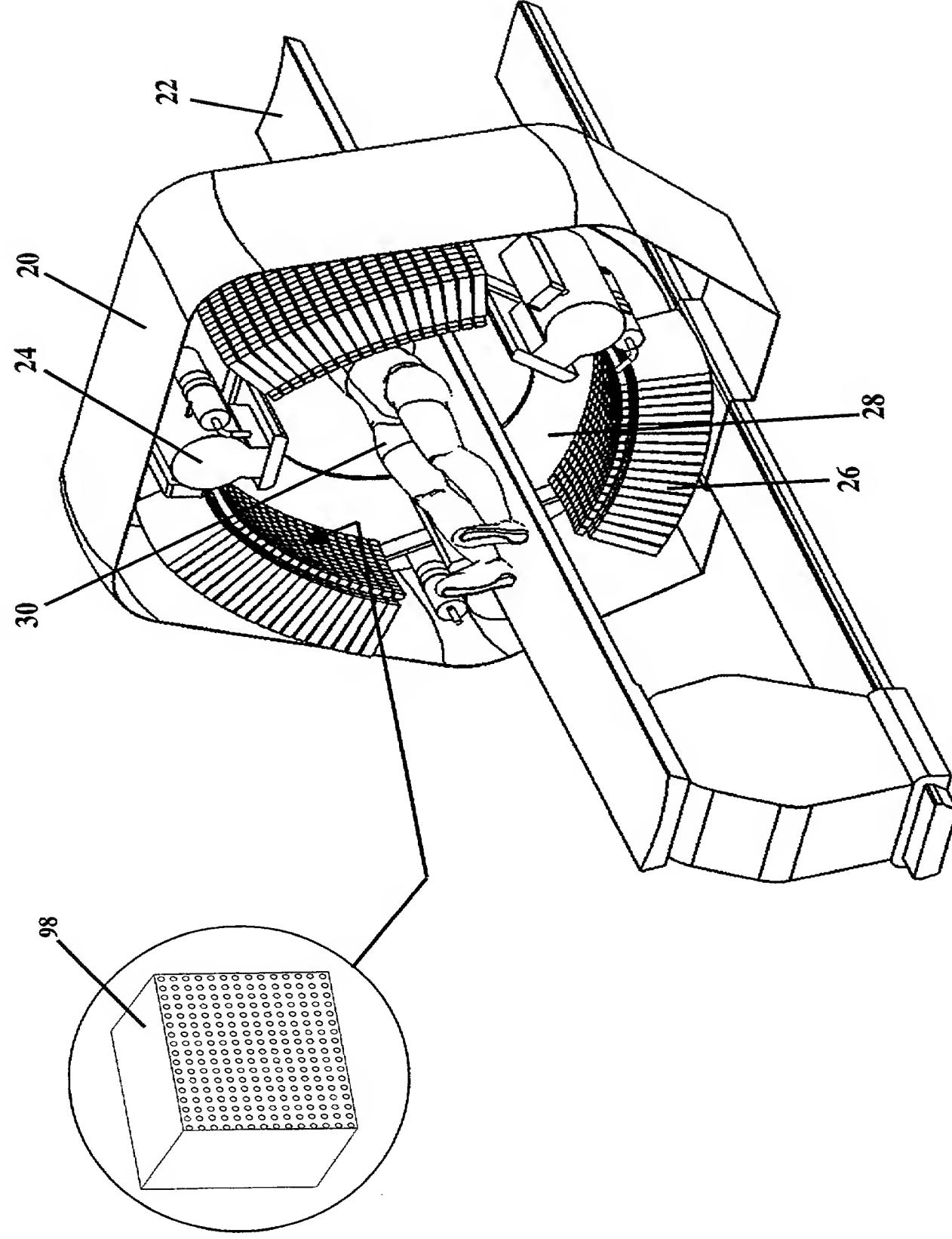


Figure 15

NM/SPECT Mode with Collimation Ring

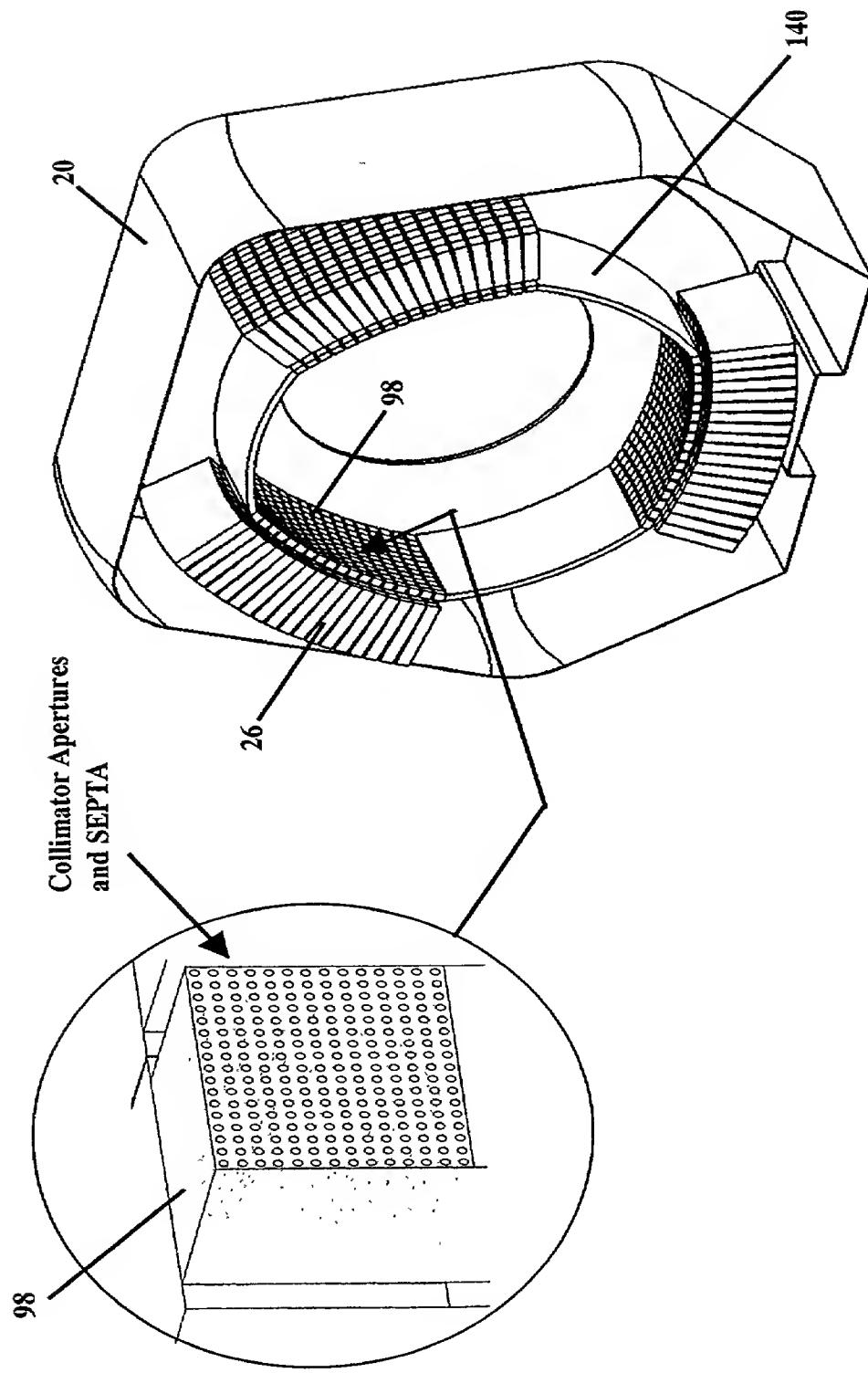
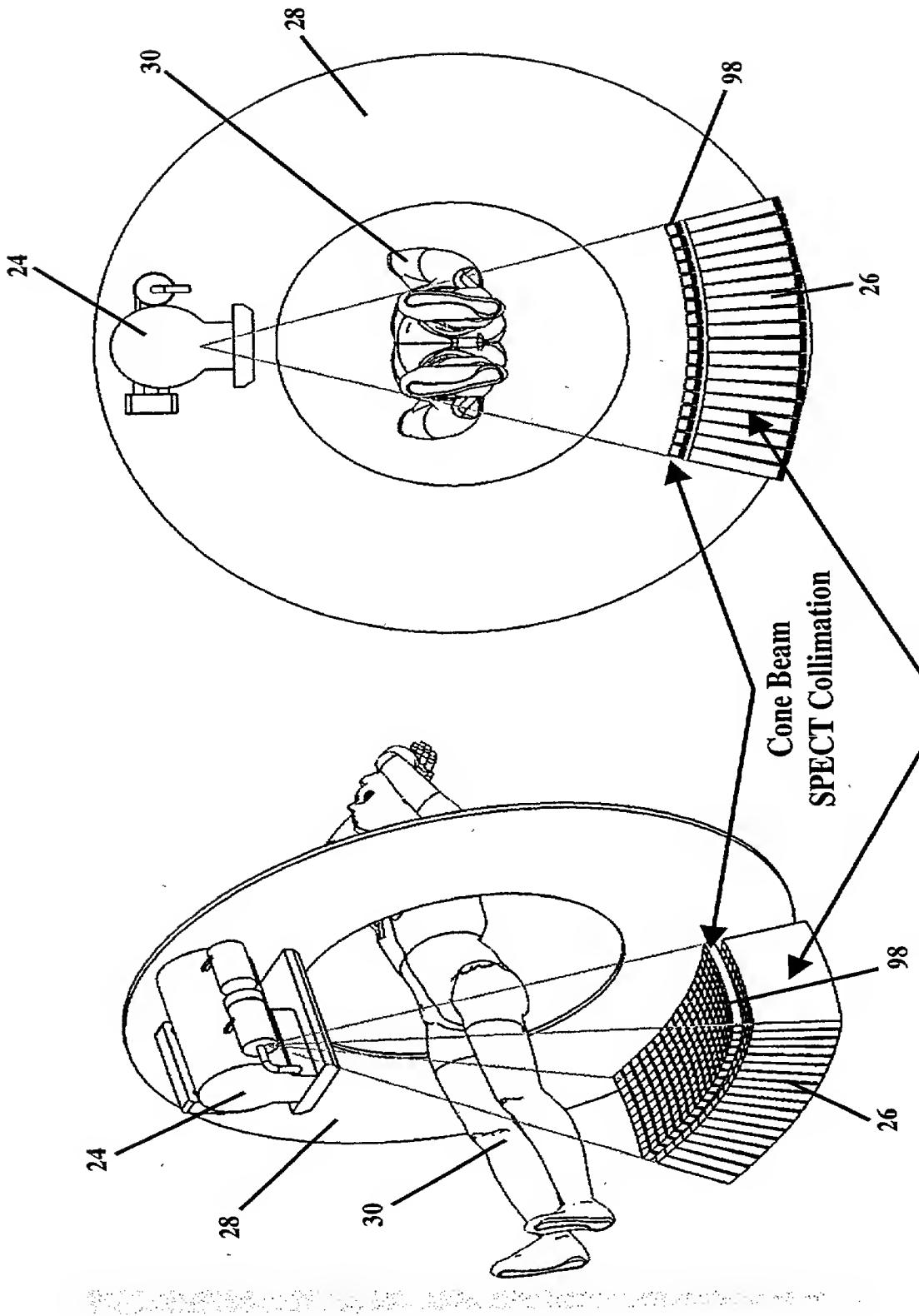


Figure 16

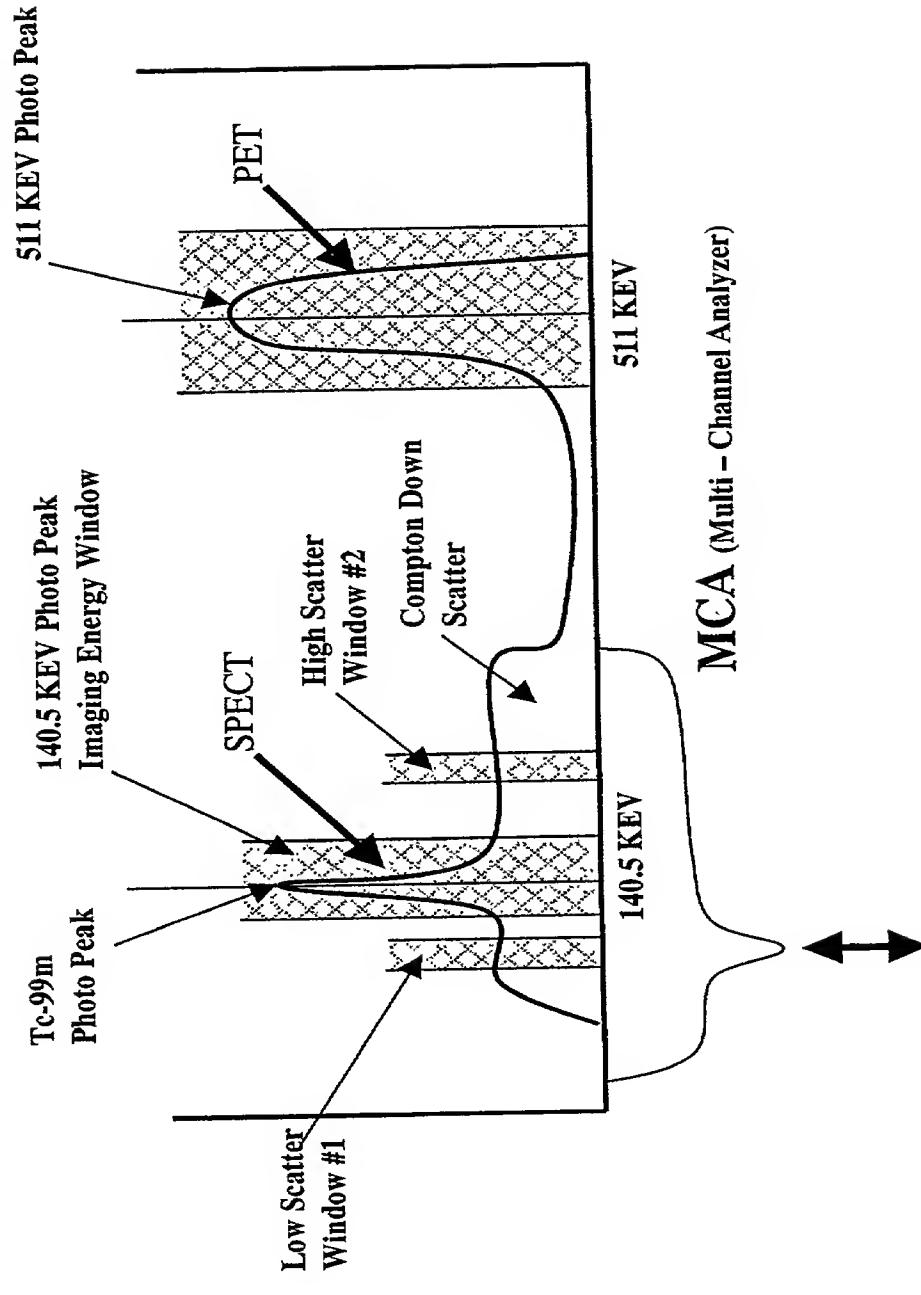
**Cone Beam NM/SPECT LEHR Collimation and Focused 2D Curved
Detector Array**



X-ray Gamma Ray Area Detector. [XGA] Detector Which
is Focused at Point Where X-ray Focal Spot is.

Figure 17

Multi-Isotope Scanning



- Scatter Correction and 511 KEV Photo Peak Suppression for SPECT Imaging
- NM/SPECT Detector Must Function with 511 KEV Isotope Present for Multi-Isotope Imaging

Figure 18

X-Ray Detector Scatter Rejection with Focused 2D Curved Collimation

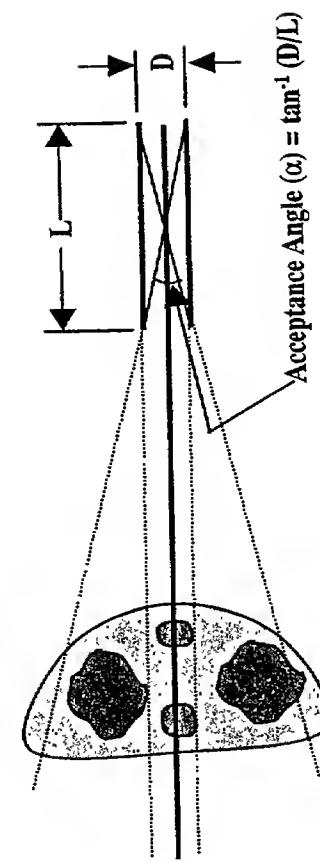
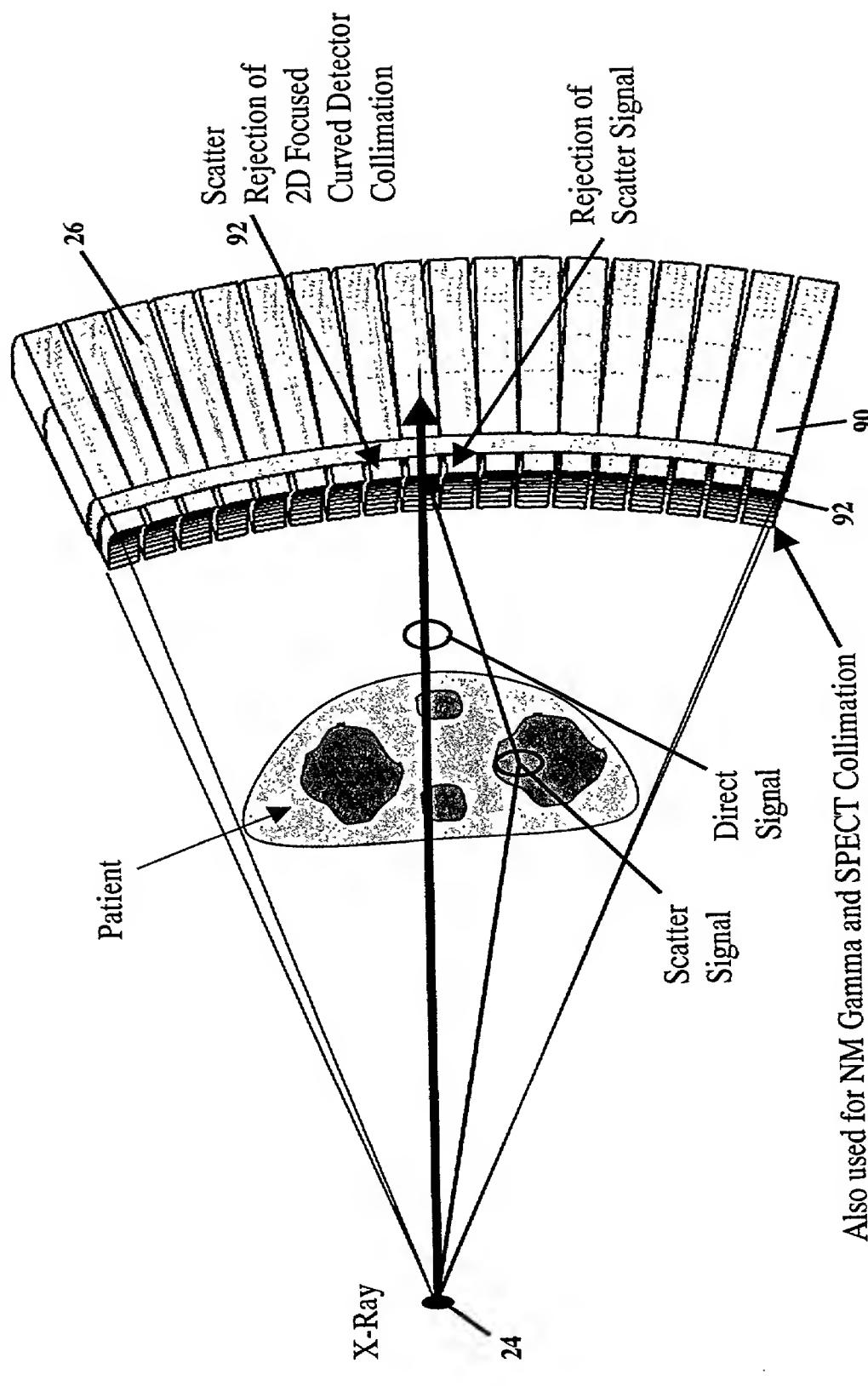


Figure 19

Sequencing of X-ray Sources for Adaptive Scatter Correction

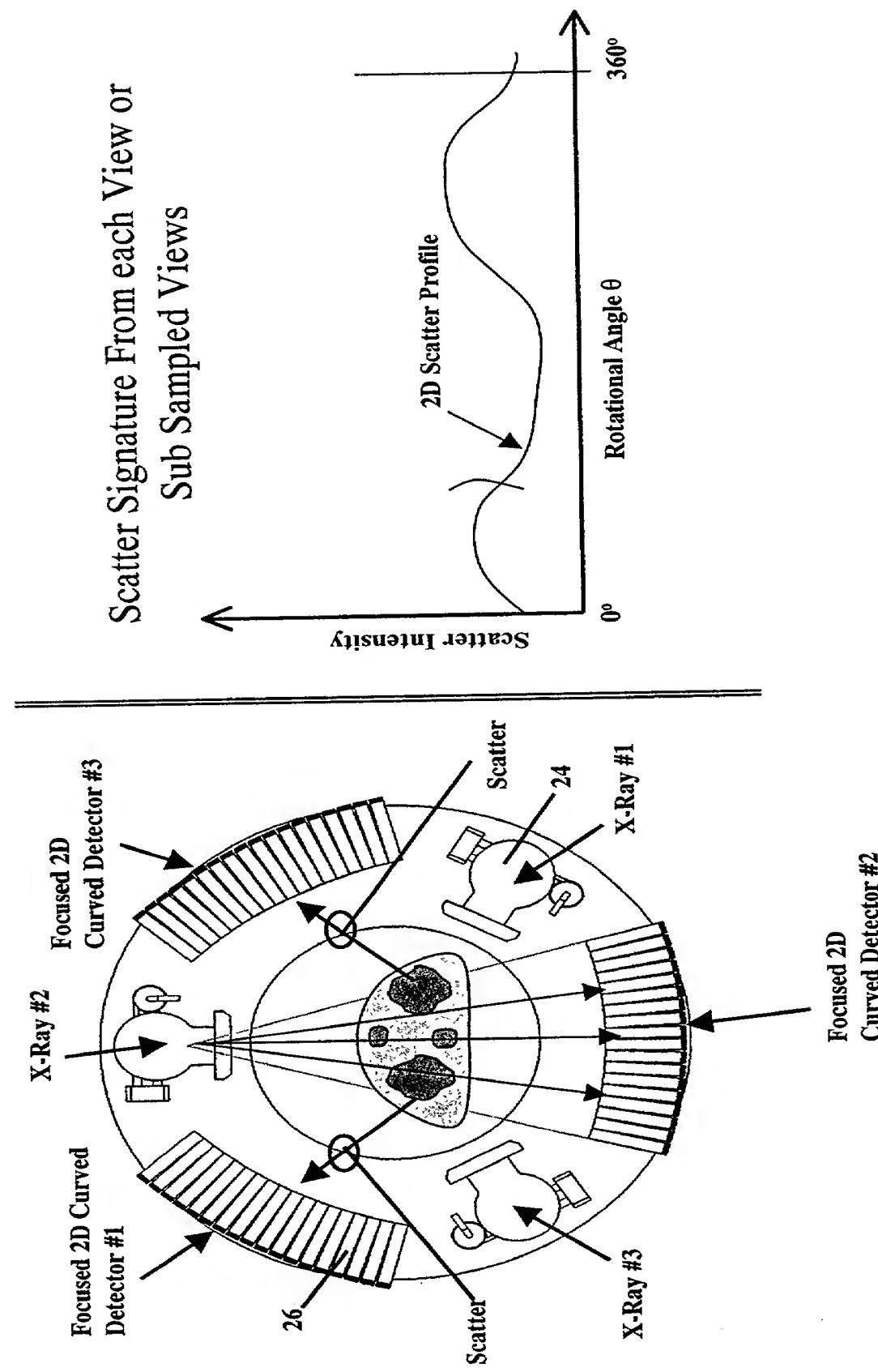


Figure 20

Modulation and Demodulation for Scatter Correction with Multiple Sources

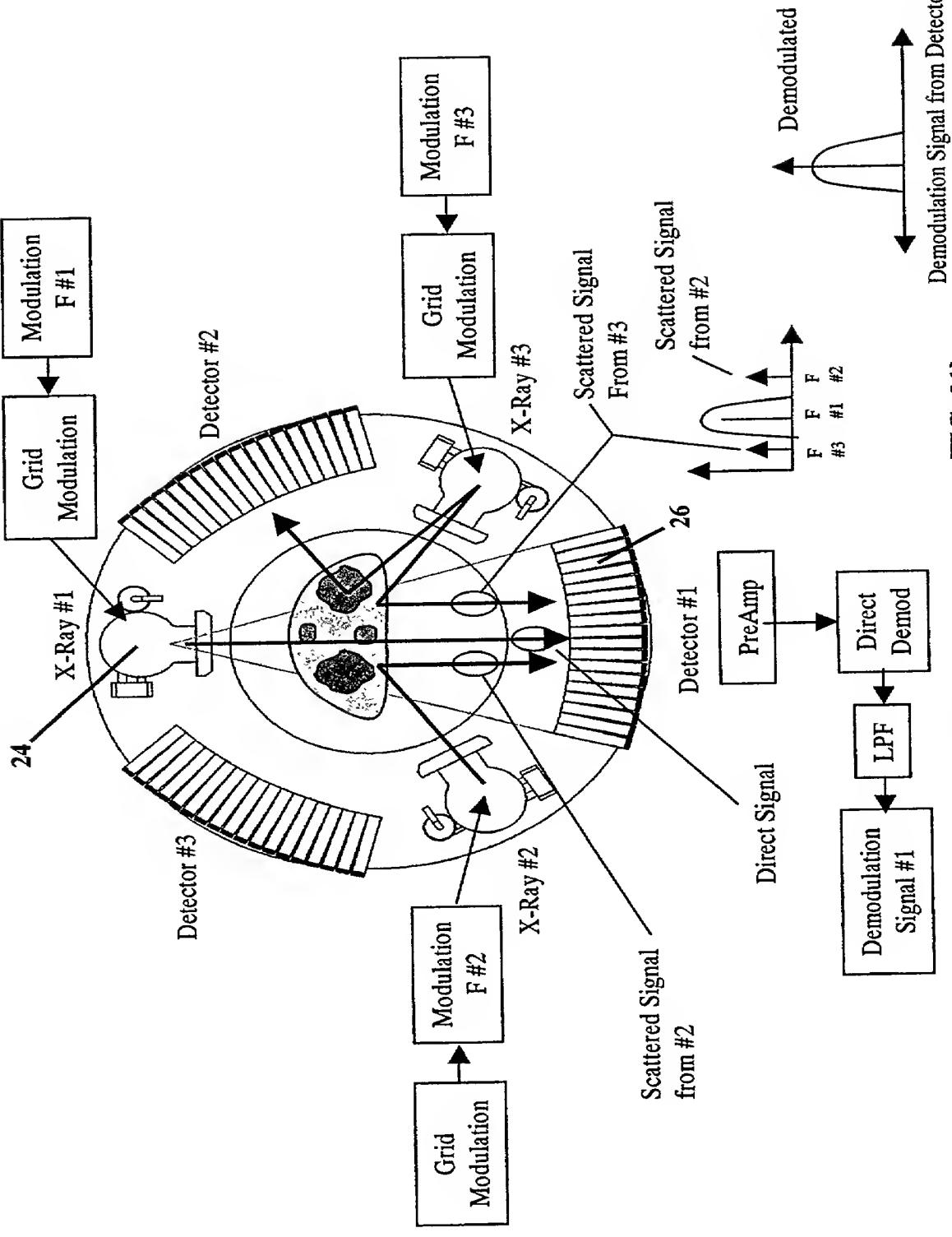


FIG. 21b

FIG. 21c

Figure 21

System Level Diagram of Modulation and Demodulation For Multiple Sources for VCT

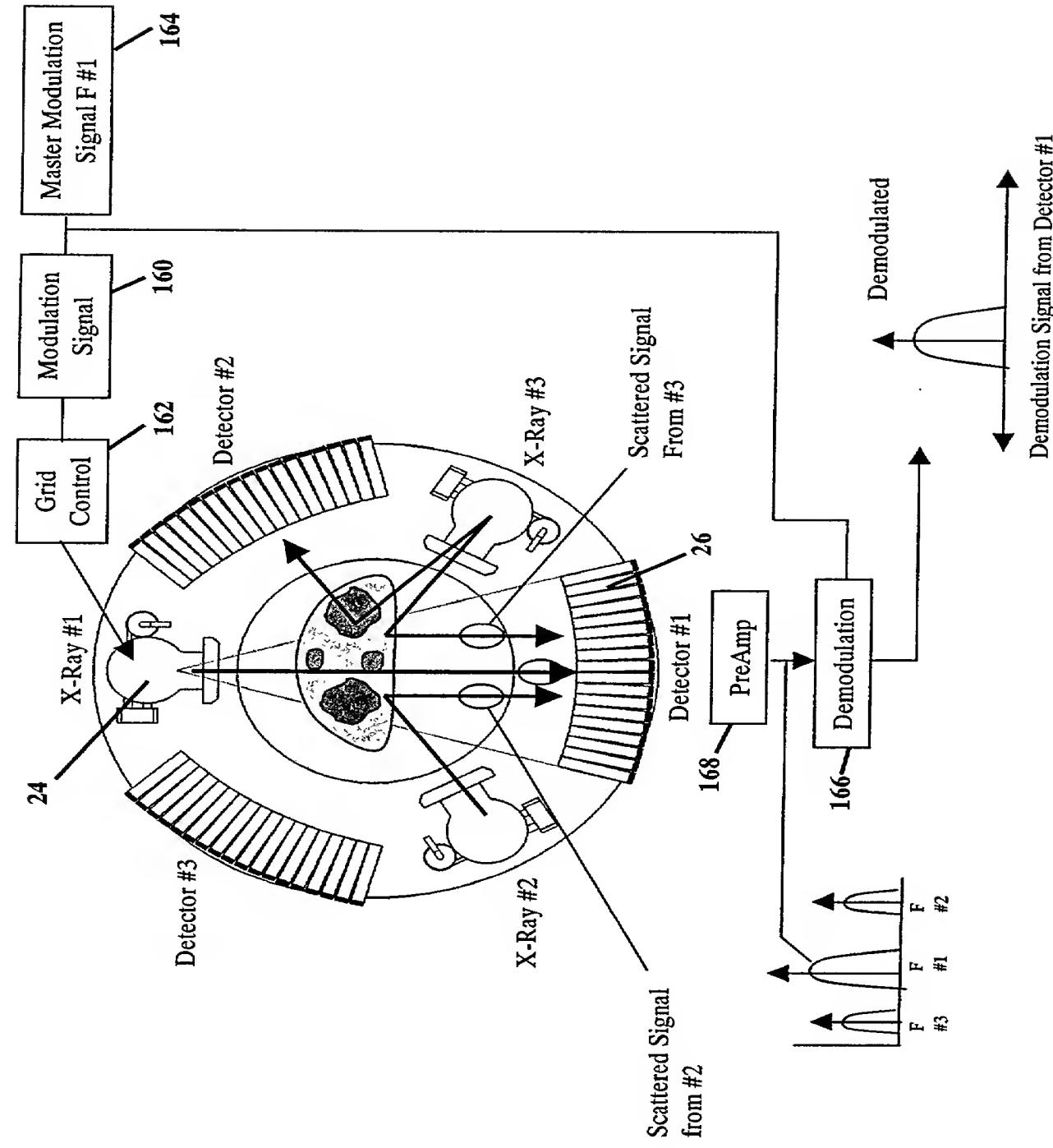


Figure 22

Step and Shoot VCT Imaging

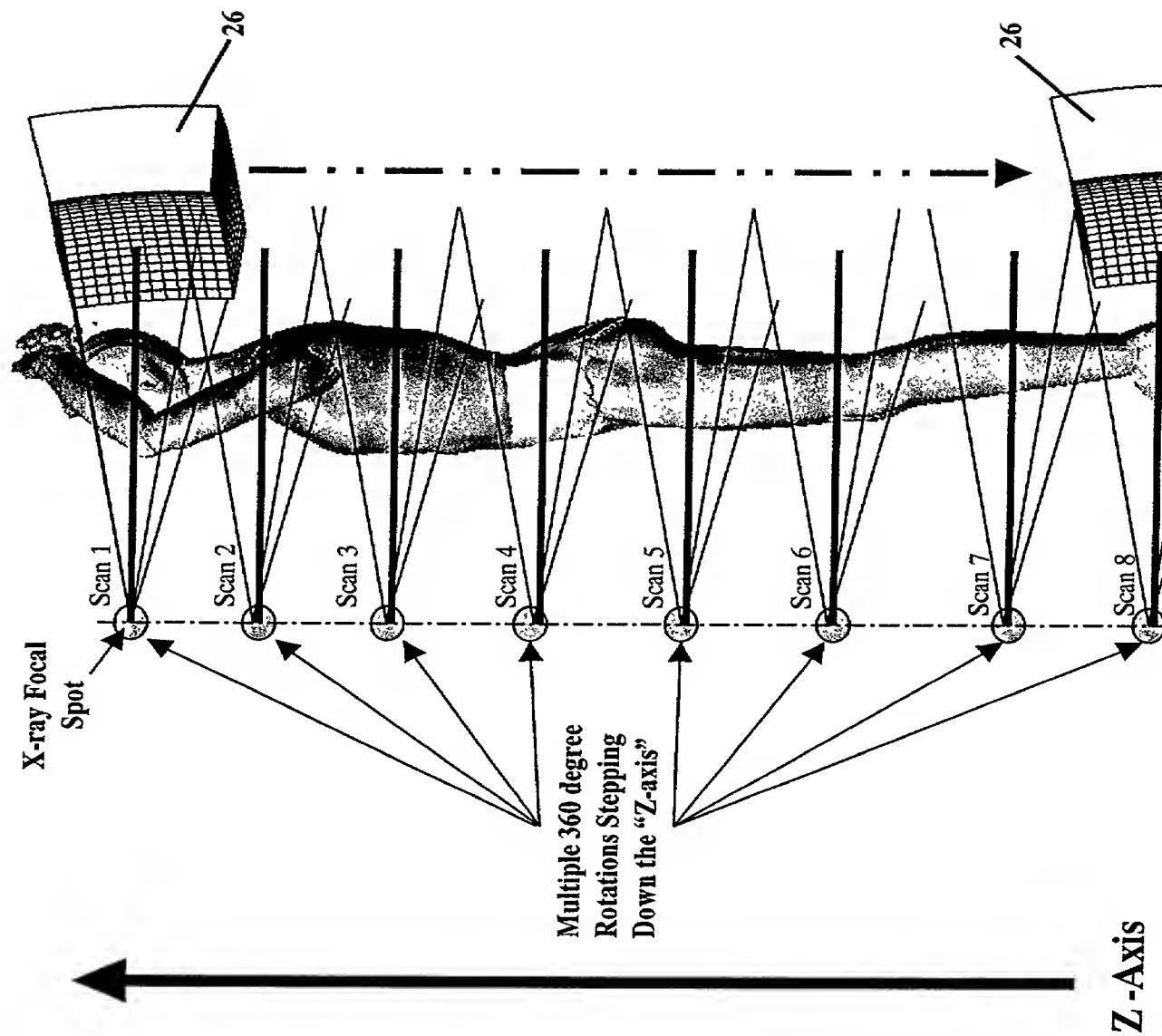


Figure 23

Spiral 3D X-Ray, DAQ and VCT for Cone Beam Reconstruction

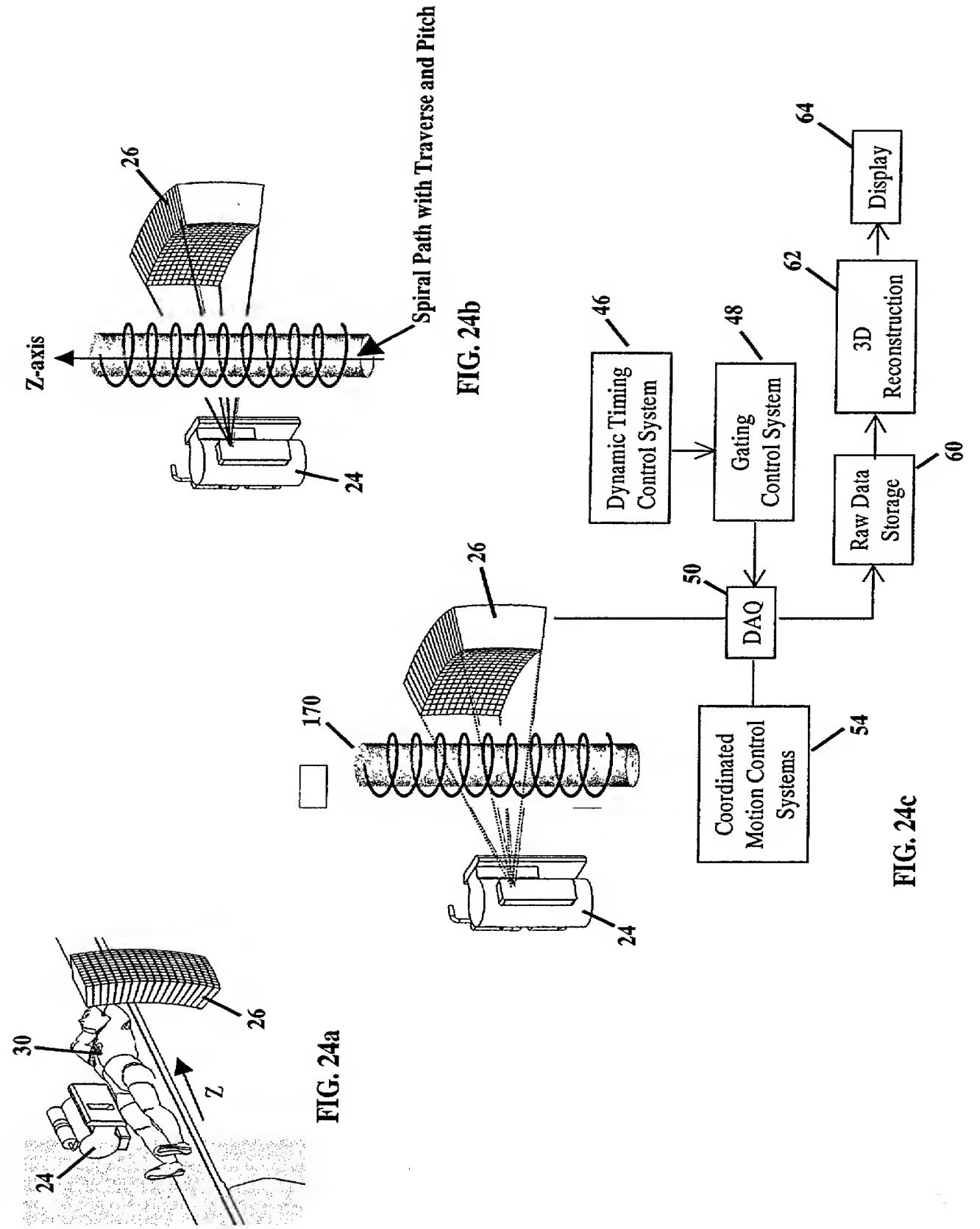
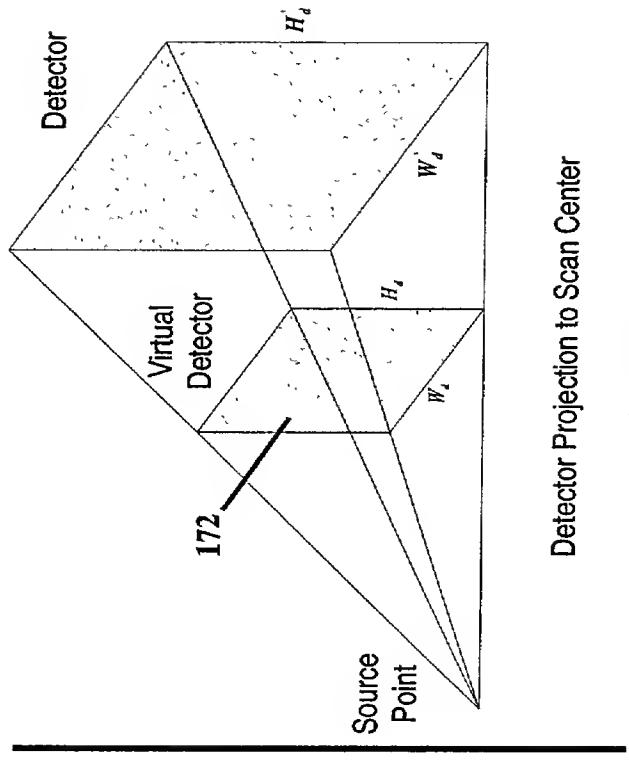
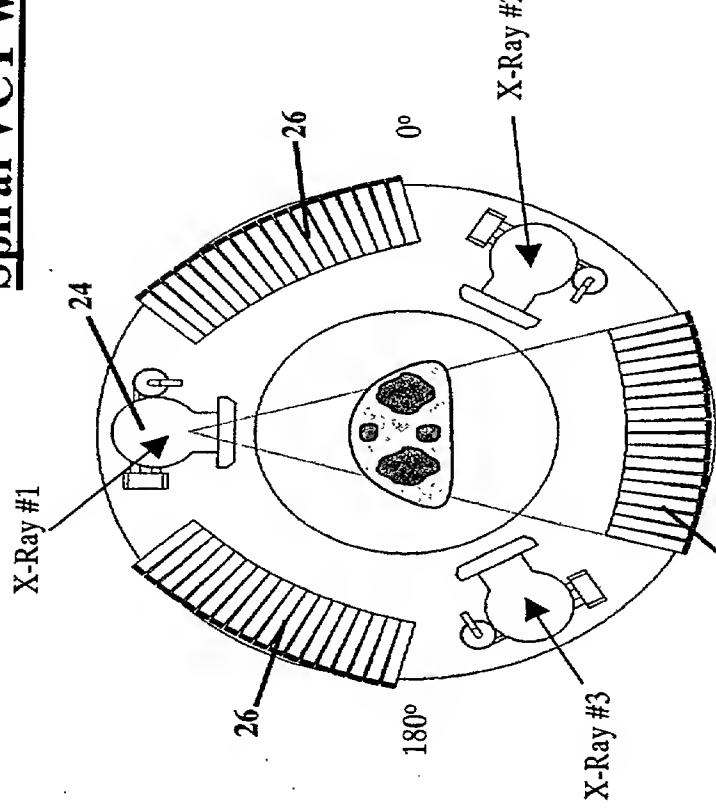
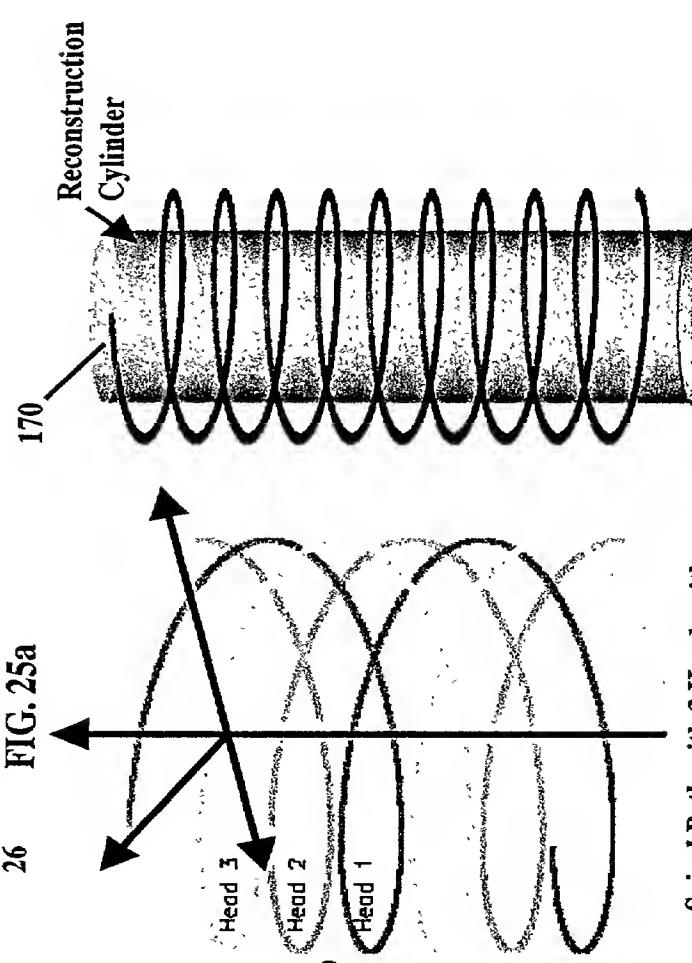


Figure 24

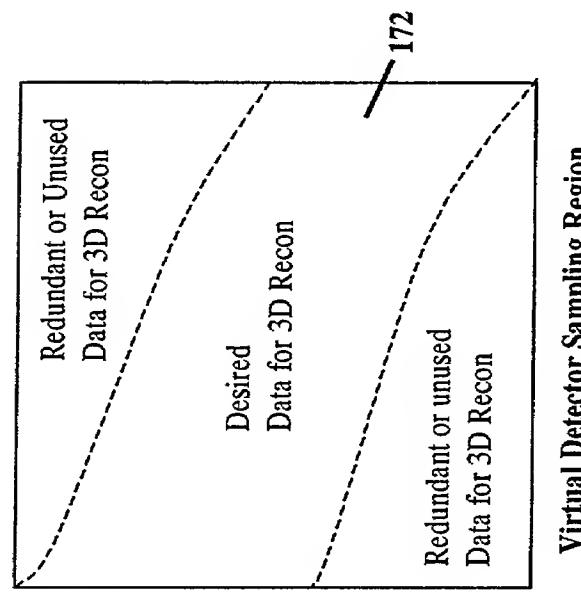
Spiral VCT with Multiple Heads



Detector Projection to Scan Center



Spiral Path with 3 Heads with
respective Central Rays on
Reconstruction Cylinder



Virtual Detector Sampling Region

Figure 25

Cone Beam Slant Source Collimation for Spiral VCT Imaging

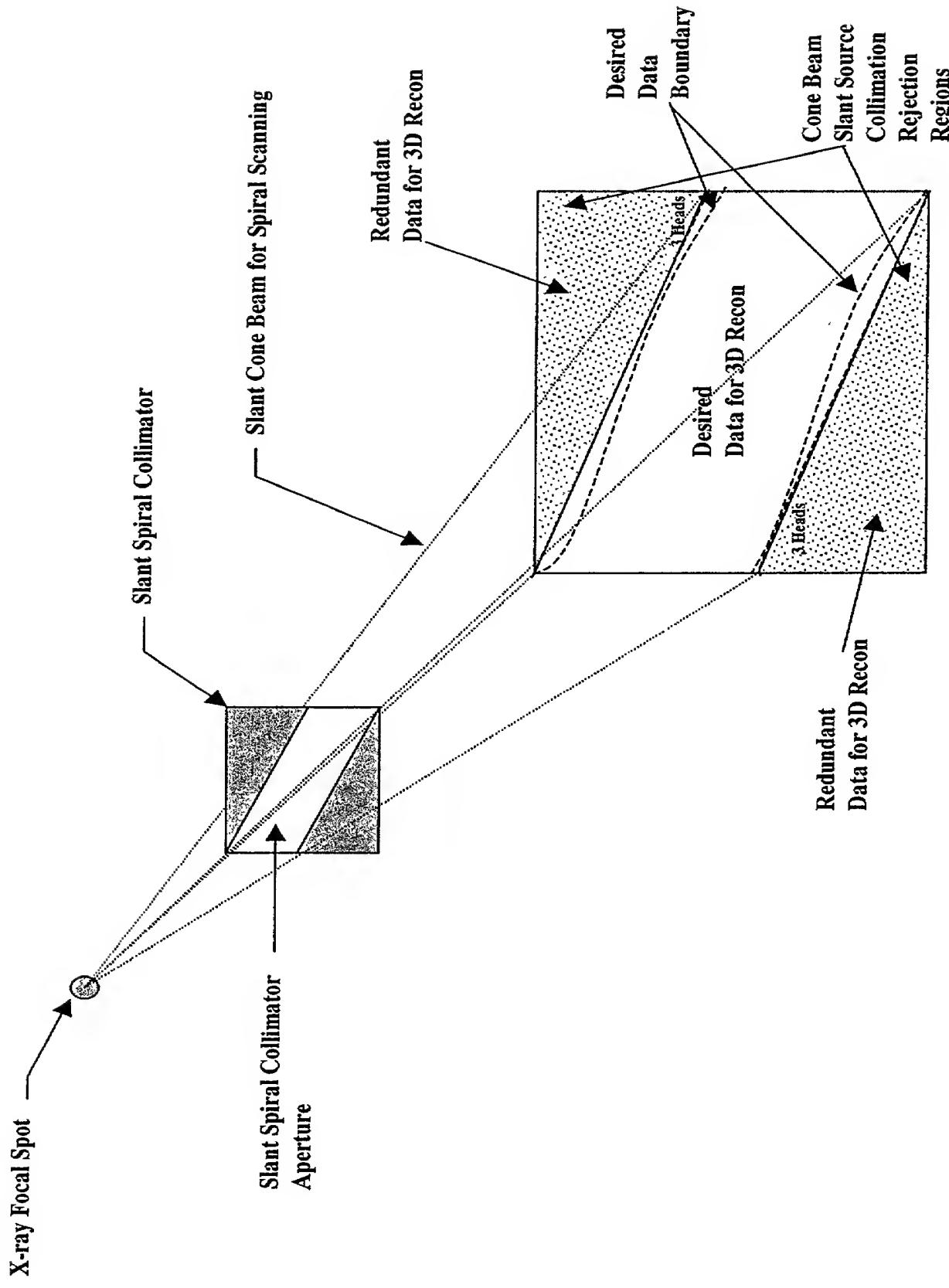


Figure 26

Multi-Plane Planning System Imaging

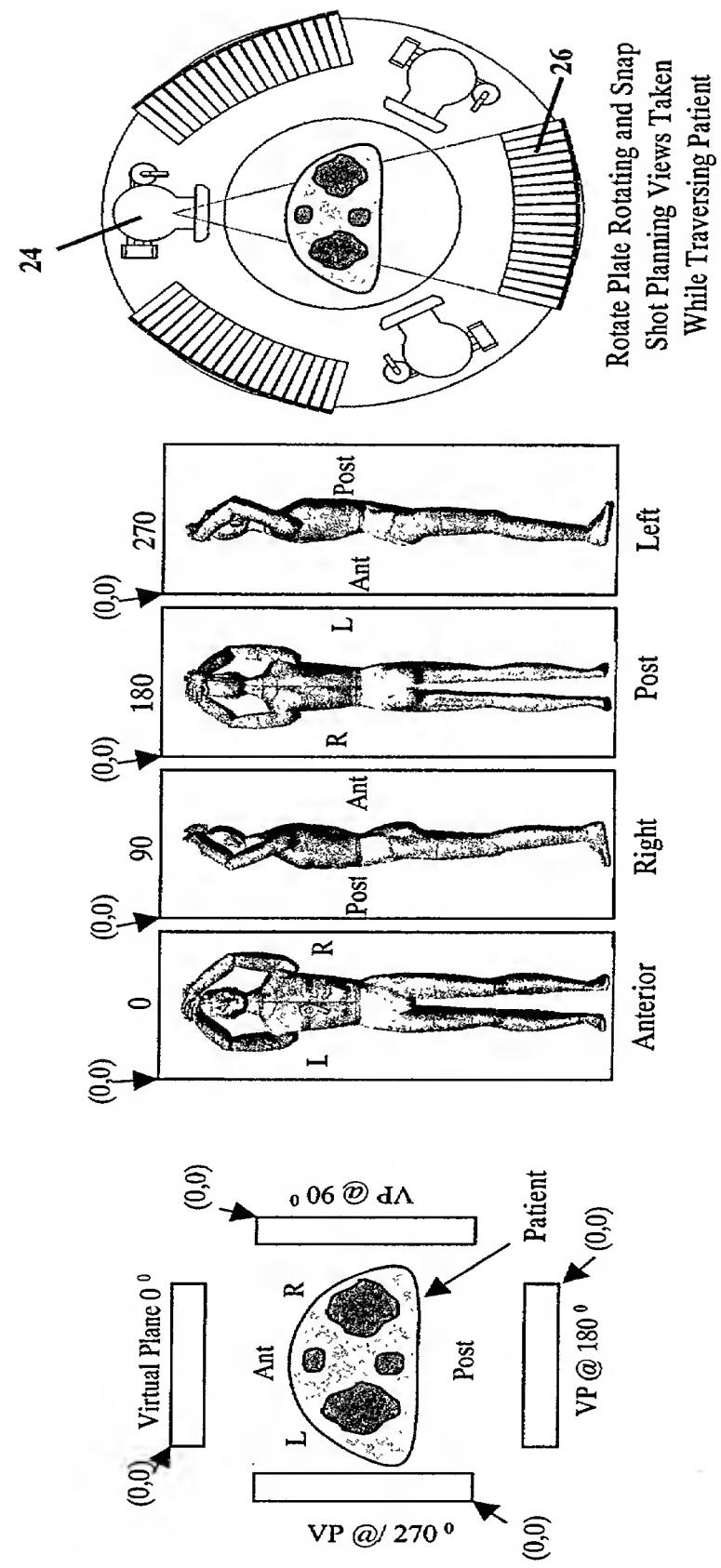


Figure 27

Whole Body Dose Control From Planning System

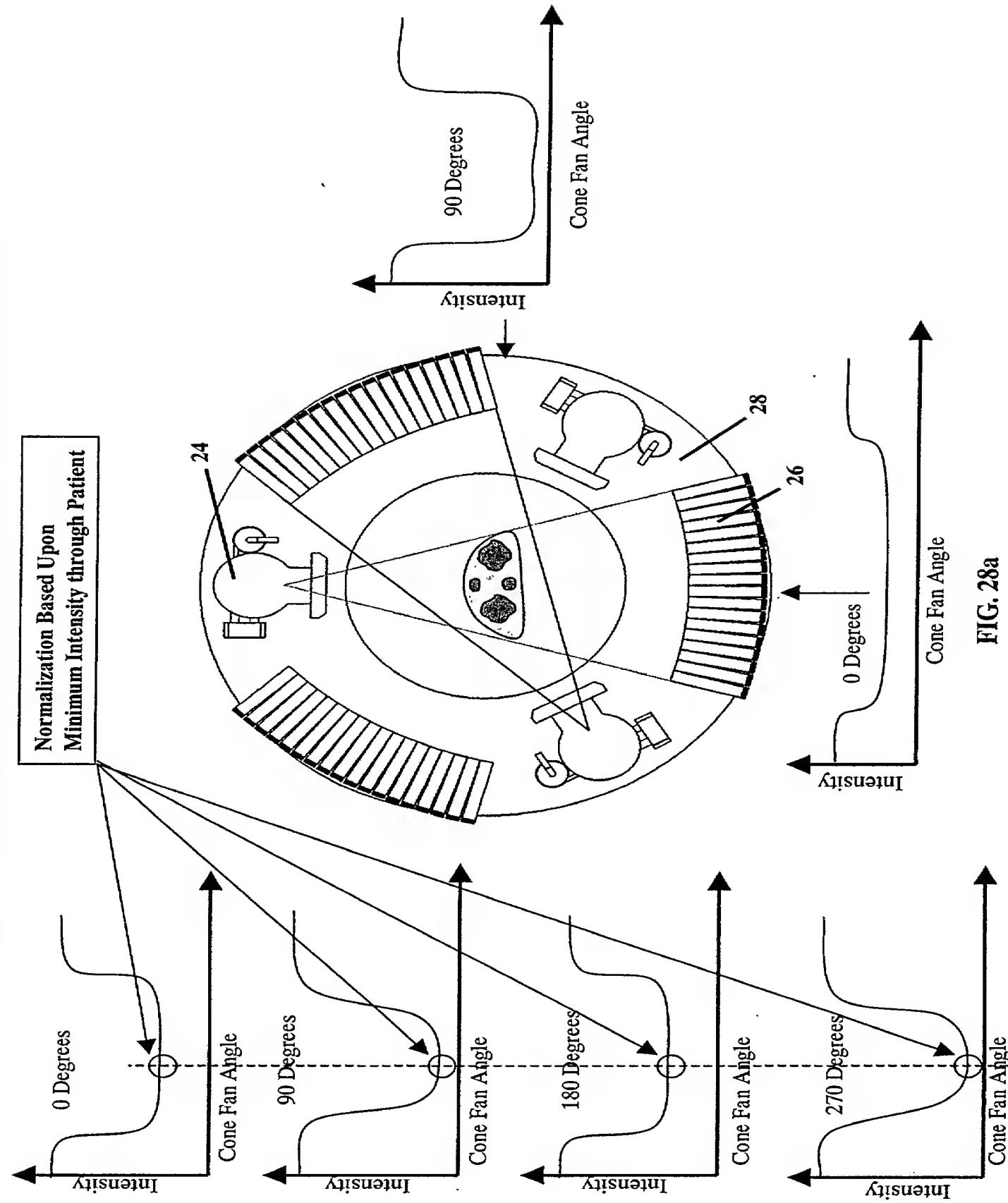


Figure 28

FIG. 28b

FIG. 28a

Dynamic Timing Control

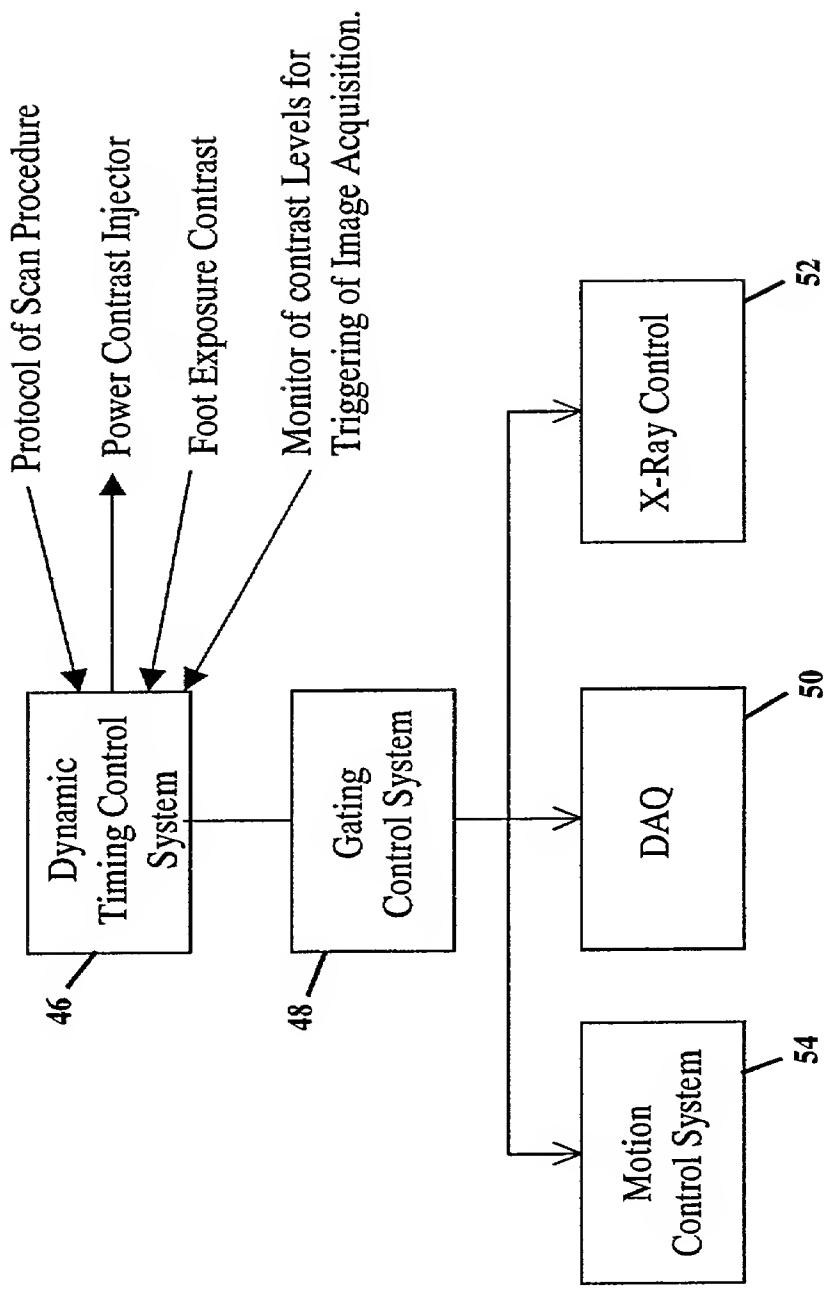


Figure 29

Retrospective Gated Imaging System

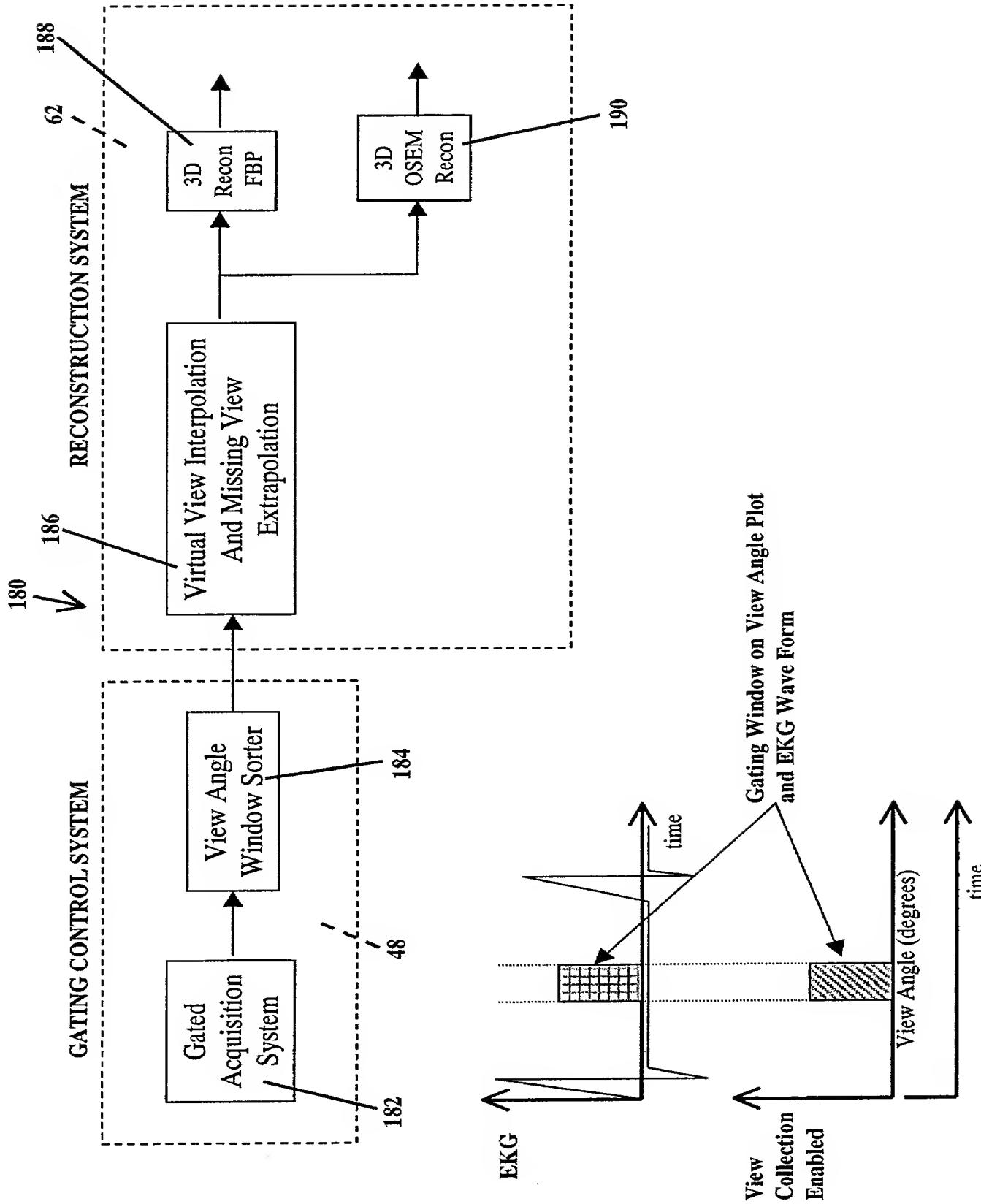


Figure 30

Prospective Gating Control System with Cardiac EKG

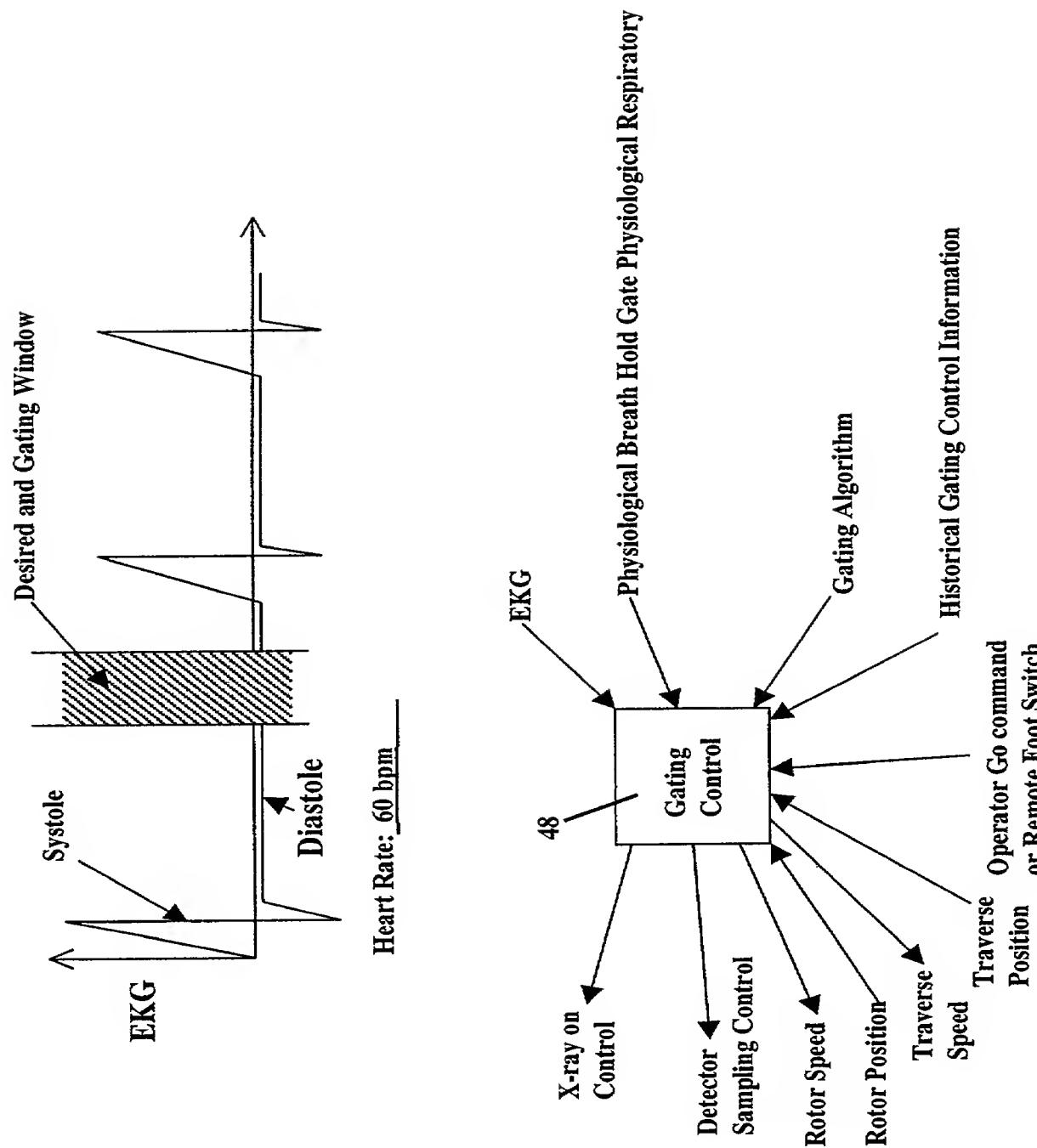


Figure 31

Prospective and Retrospective Gated DAQ and Reconstruction Imaging

Prospective Gating Control

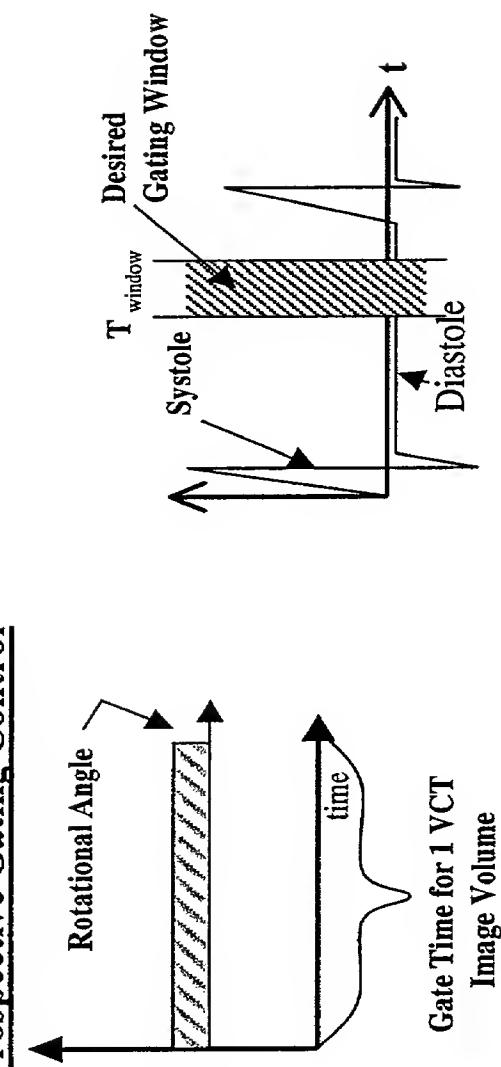


FIG. 32a

Retrospective Gating Control

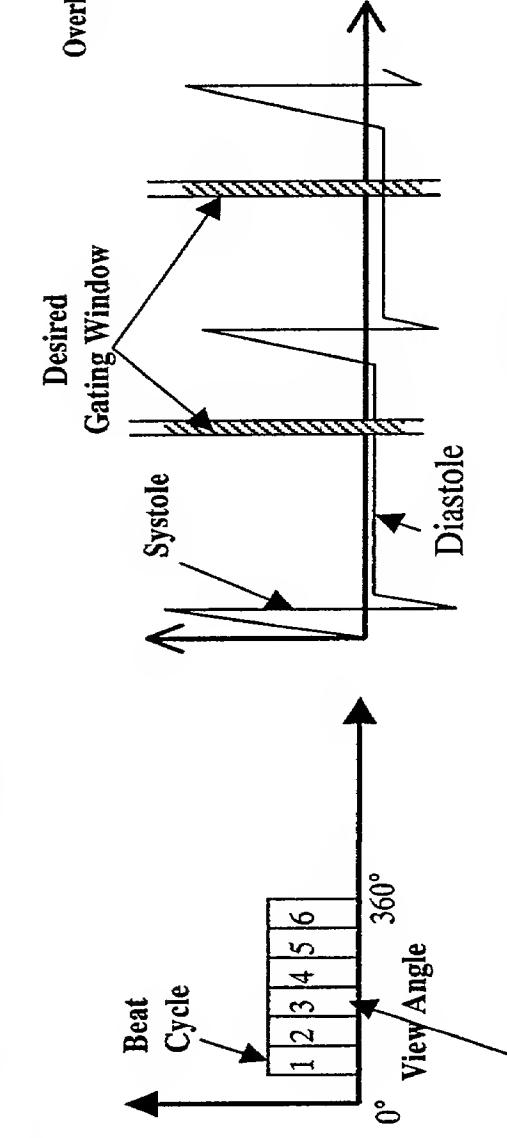


FIG. 32b

Multi Cycle – Contiguous

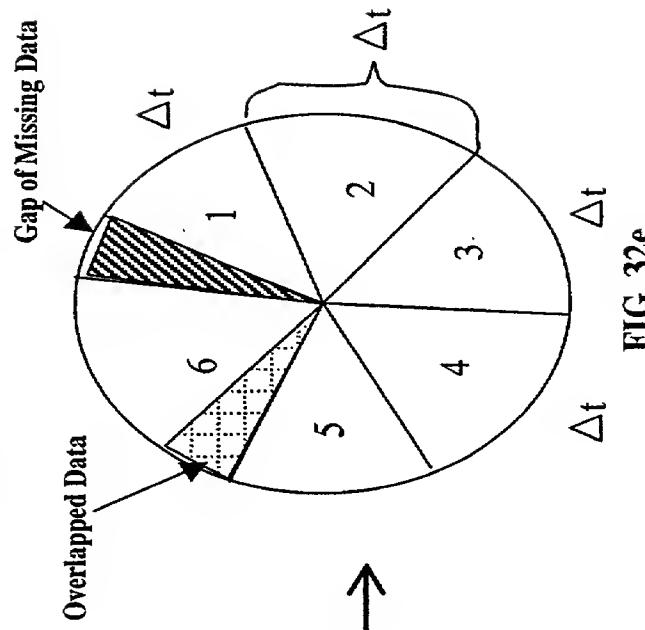


FIG. 32c

Figure 32

Multiple cardiac cycles to fill needed Views. Collect all views in (n) cycles of Heart.

FIG. 32d

FIG. 32e

FIG. 32e

Gated DAO and Reconstruction for Retrospective Cine' Dynamic Cardiac Imaging

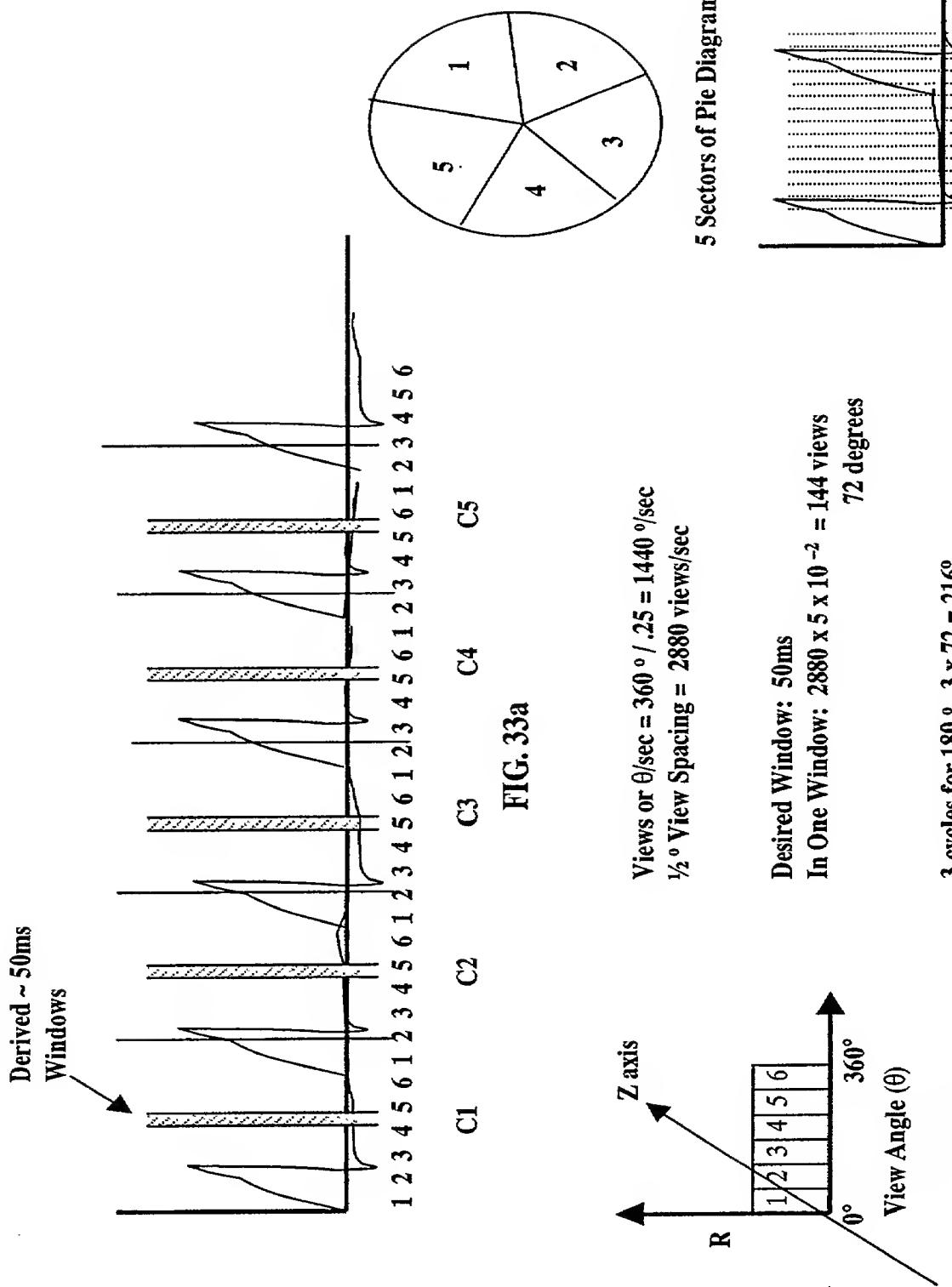


Figure 33

PET Transmission, Attenuation & Scatter Correction

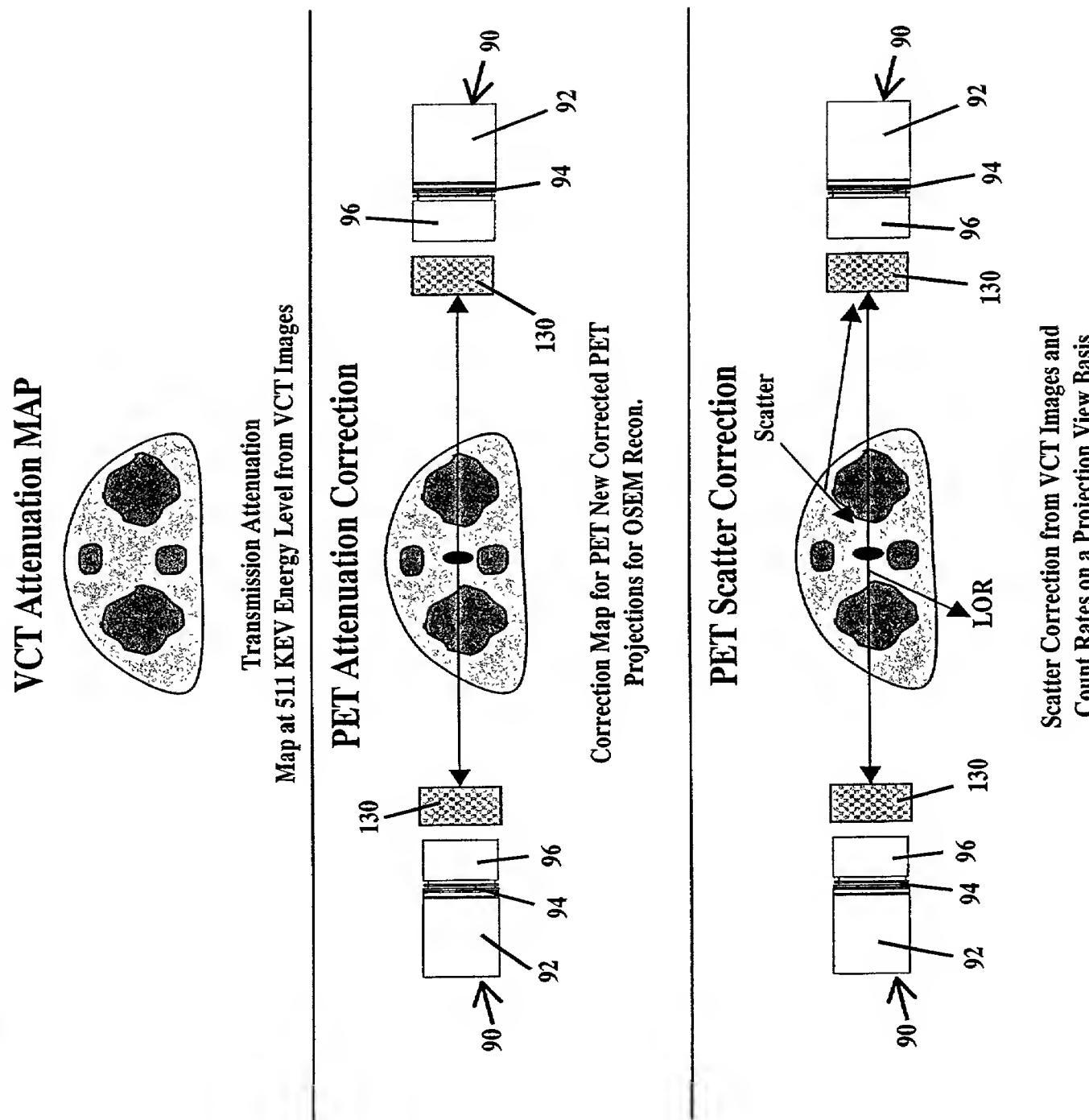
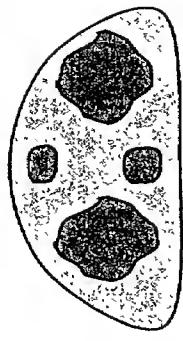


Figure 34

NM/SPECT Transmission, Attenuation & Scatter Correction

VCT Attenuation MAP



Transmission Attenuation
Map at NM/SPECT Energy Levels from VCT Images

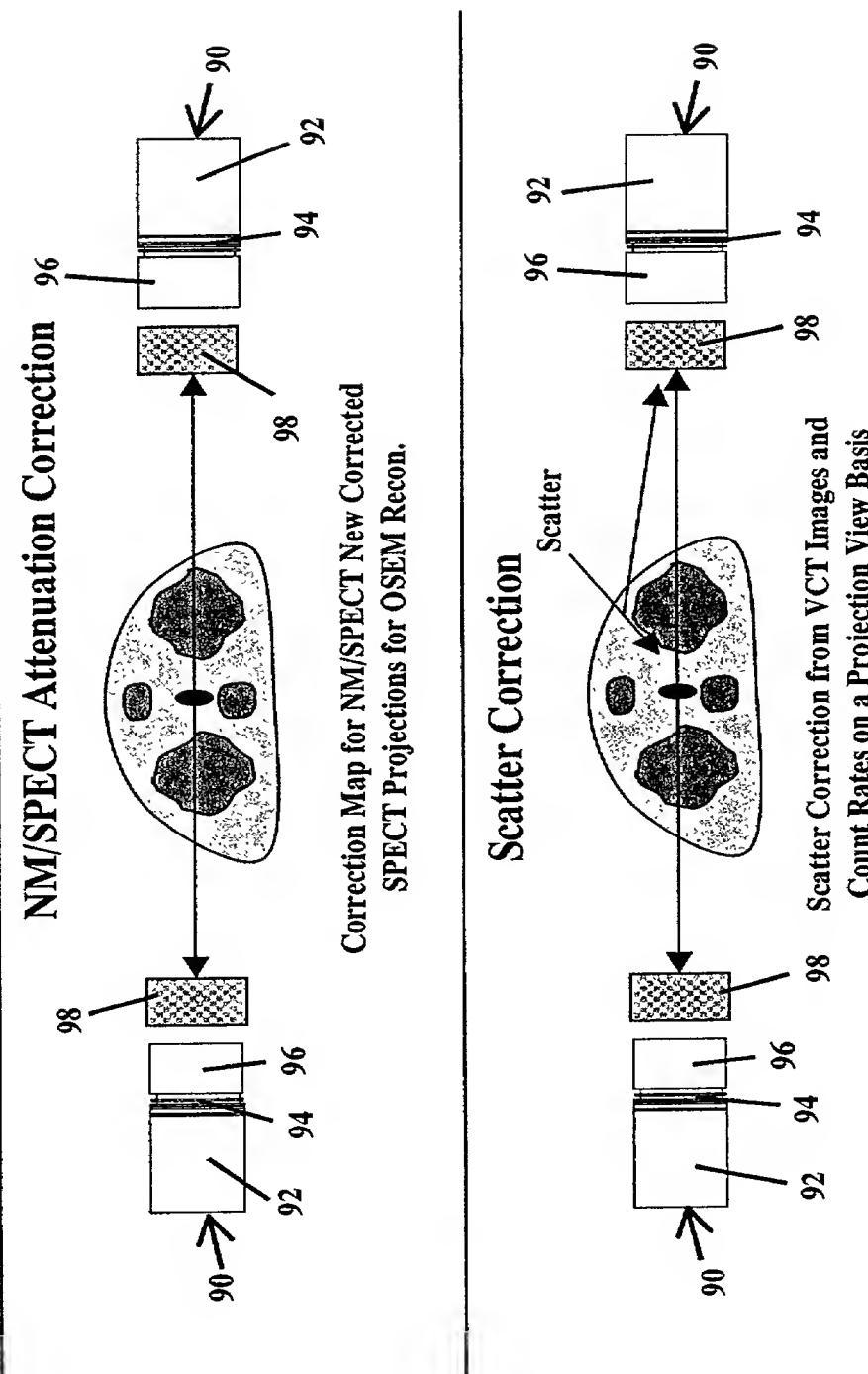


Figure 35

Patient Fused Multi-Modality Imaging and Analysis System

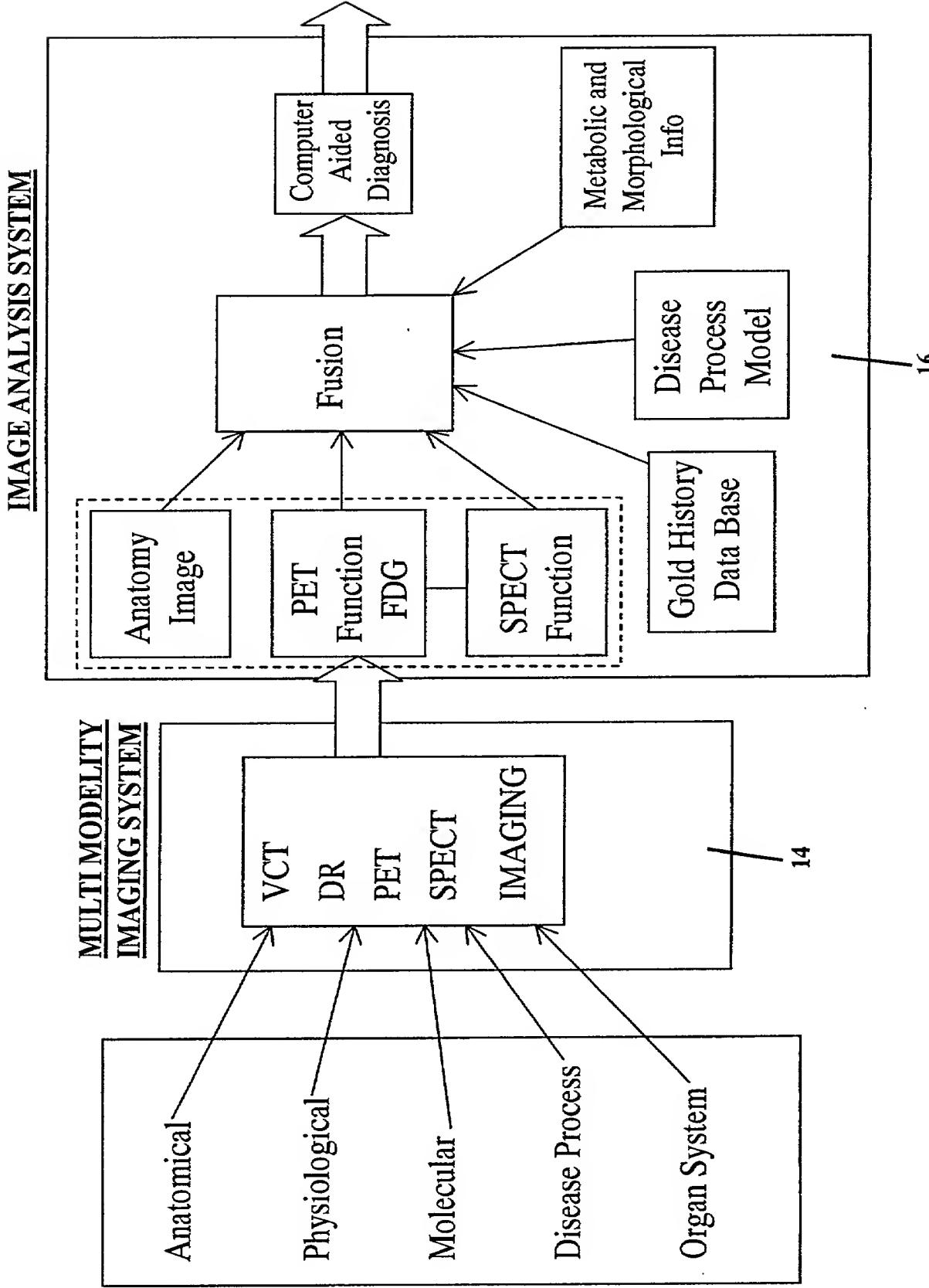


Figure 36

Interventional Image Control System

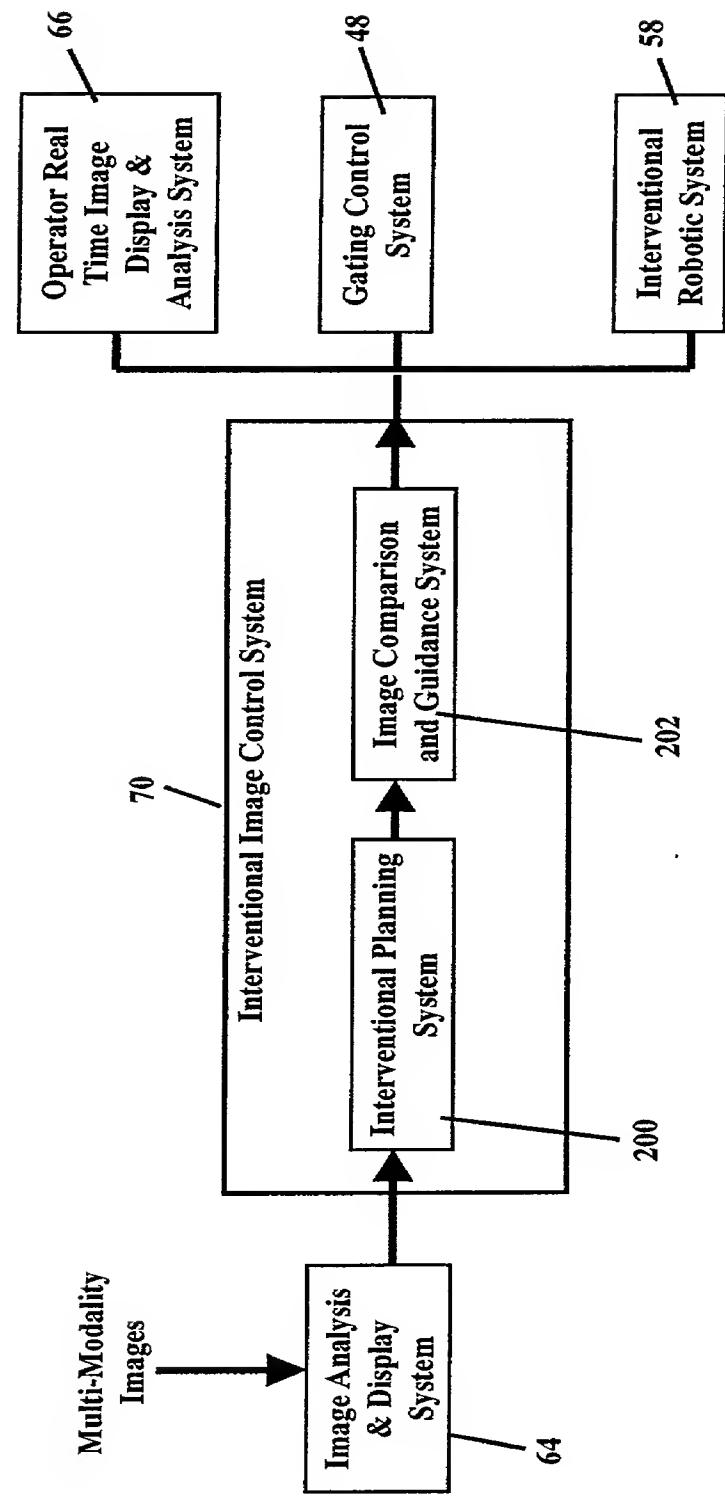


Figure 37

Multi-Modality Imaging with Independent X-Ray VCT, PET, and NM/SPECT Image Acquisition System

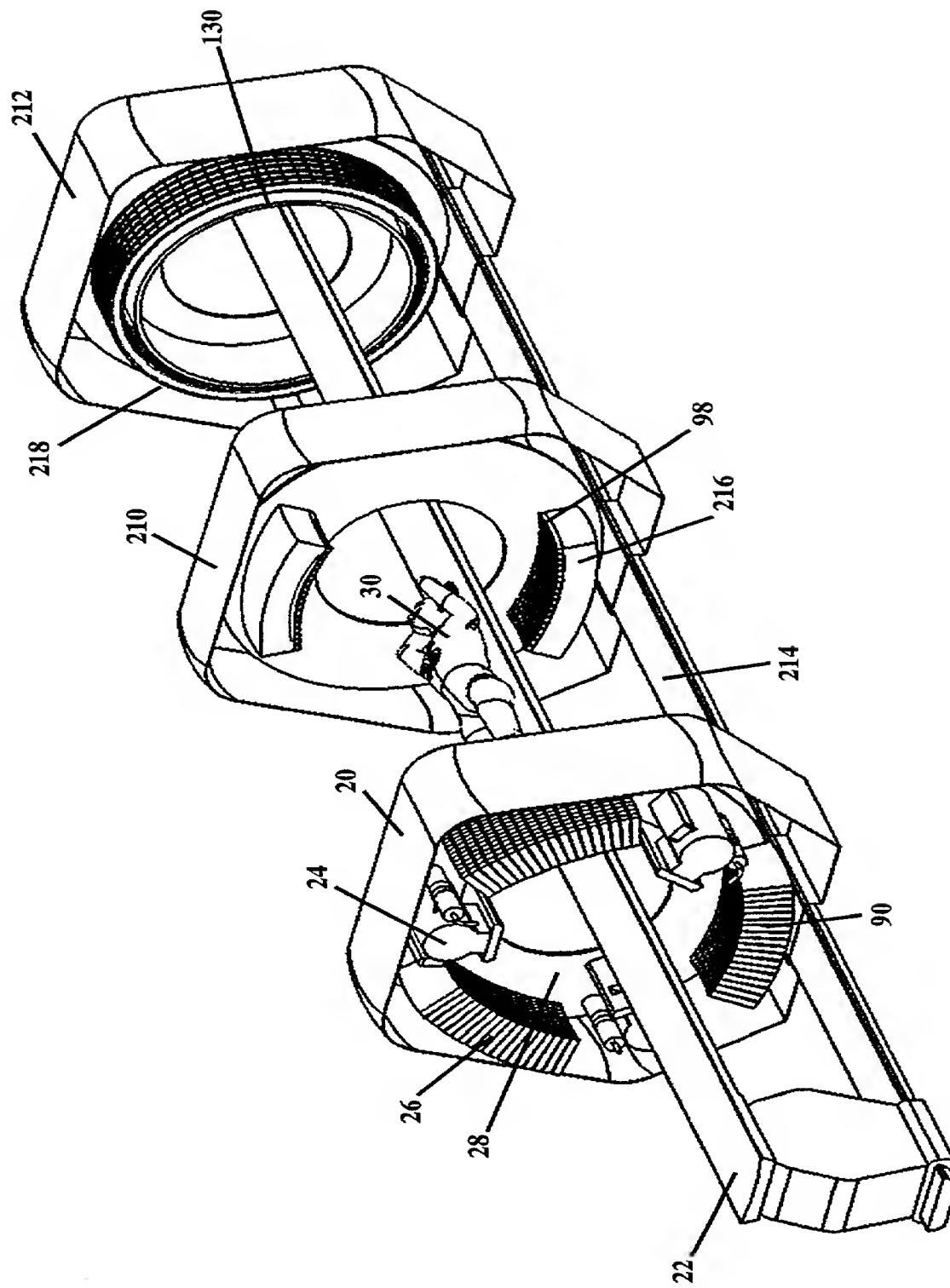


Figure 38

**Multi-Modality Imaging with Independent X-Ray Single Head VCT, PET, and
NM/SPECT Image Acquisition System**

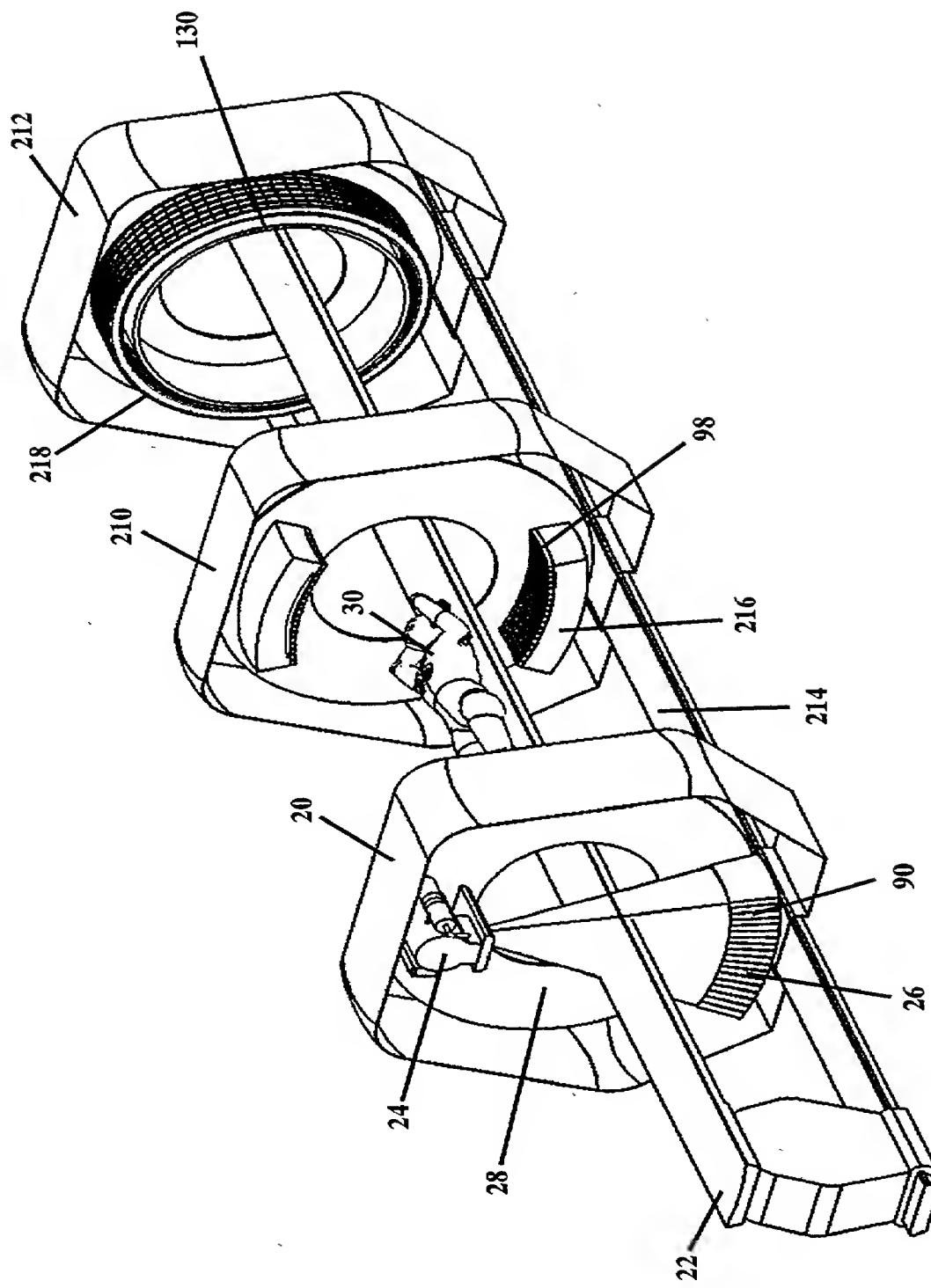


Figure 39

**Multi-Modality Imaging with Independent X-Ray 4th Generation VCT,
PET, and NM/SPECT Image Acquisition System**

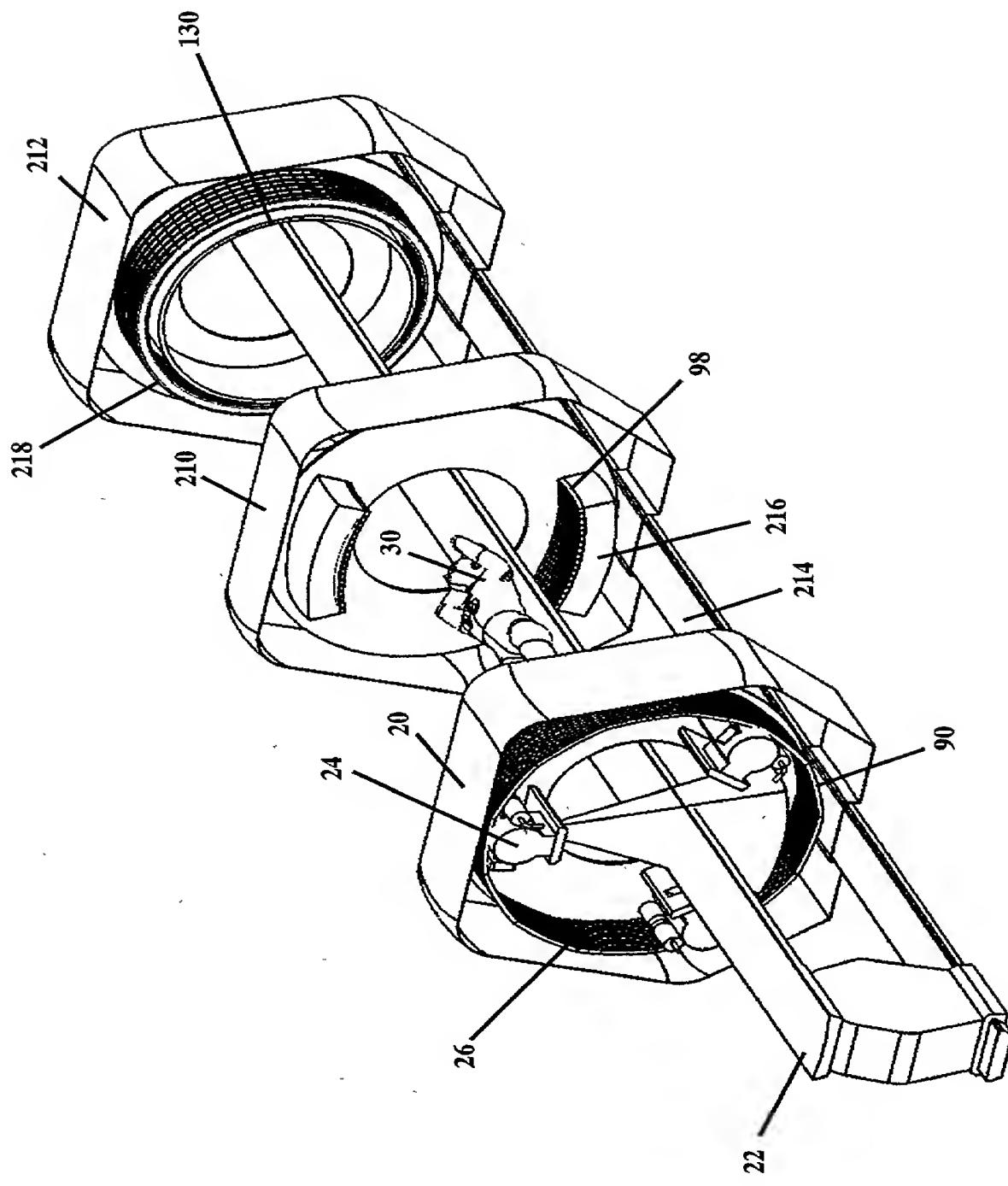


Figure 40

Multi-Modality Imaging System with Stationary
Focused 2D Curved Detector for VCT, PET and NM/SPECT Imaging

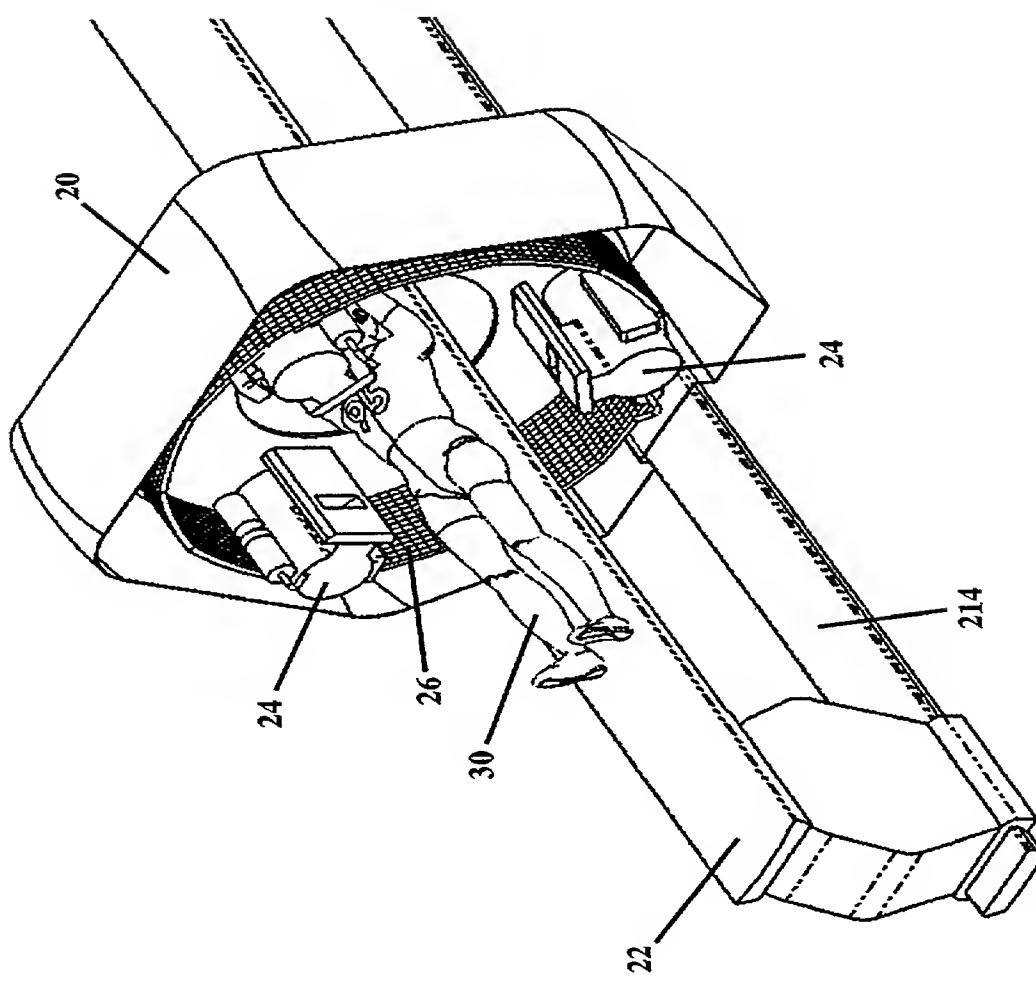


Figure 41

**Multi-Modality Imaging with Common Gantry and Independent X-Ray VCT,
PET, and NM/SPECT Image Acquisition System**

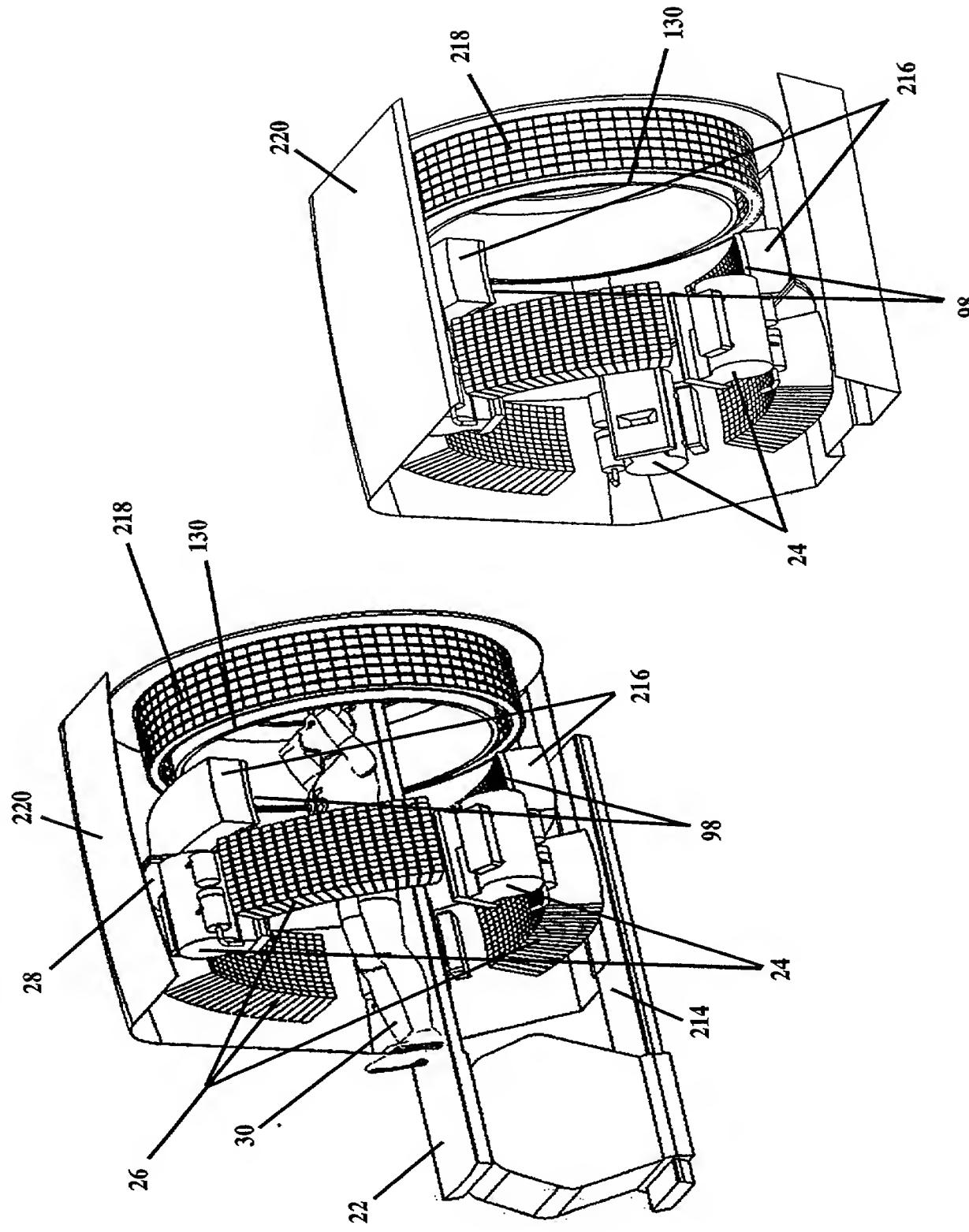


Figure 42

Multi-Modality Imaging with Common Gantry and Independent X-Ray
Single Head VCT, PET, and NM/SPECT Image Acquisition System

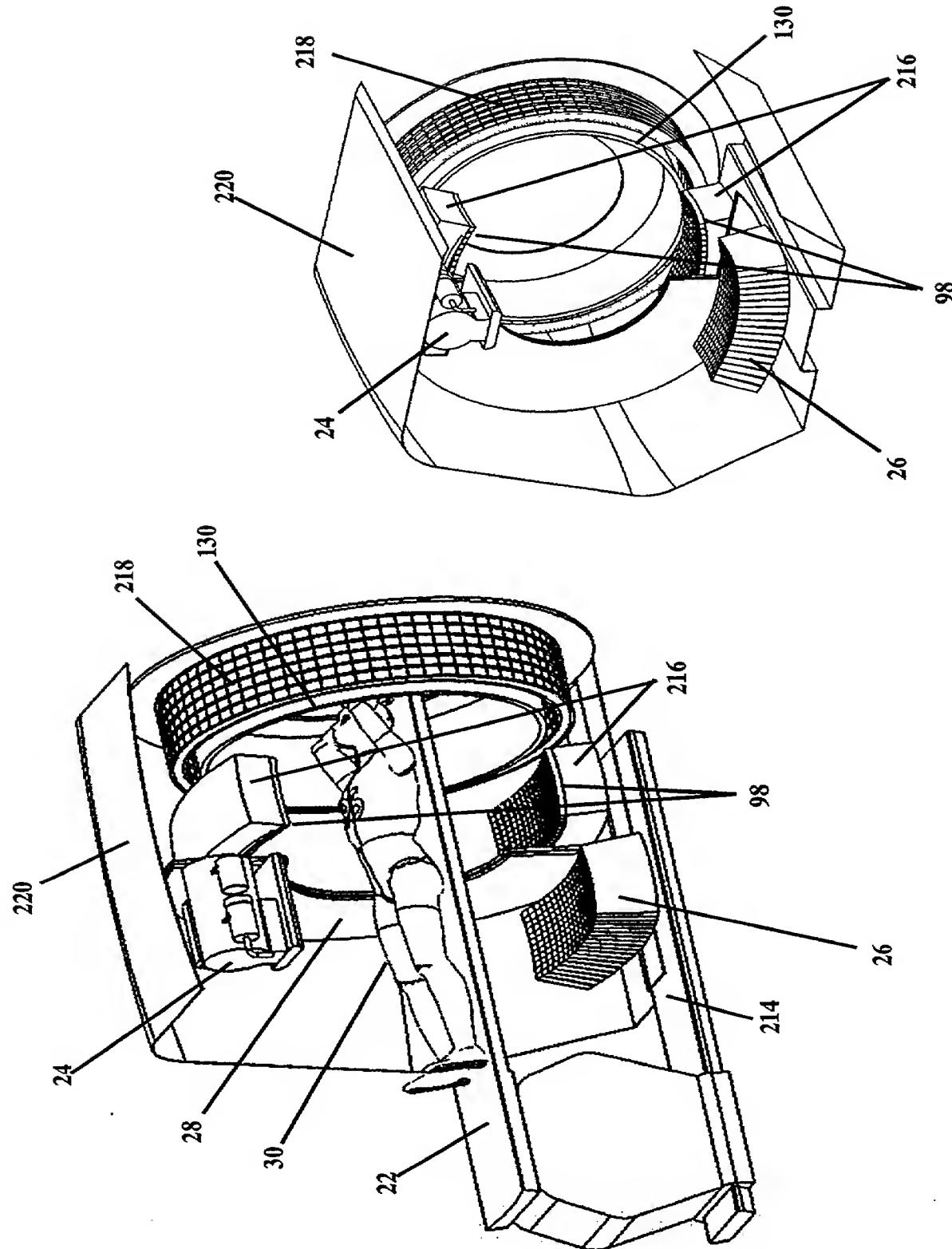


Figure 43

Multi-Modality Imaging with Common Gantry and Independent X-Ray
4th Generation VCT, PET, and NM/SPECT Image Acquisition System

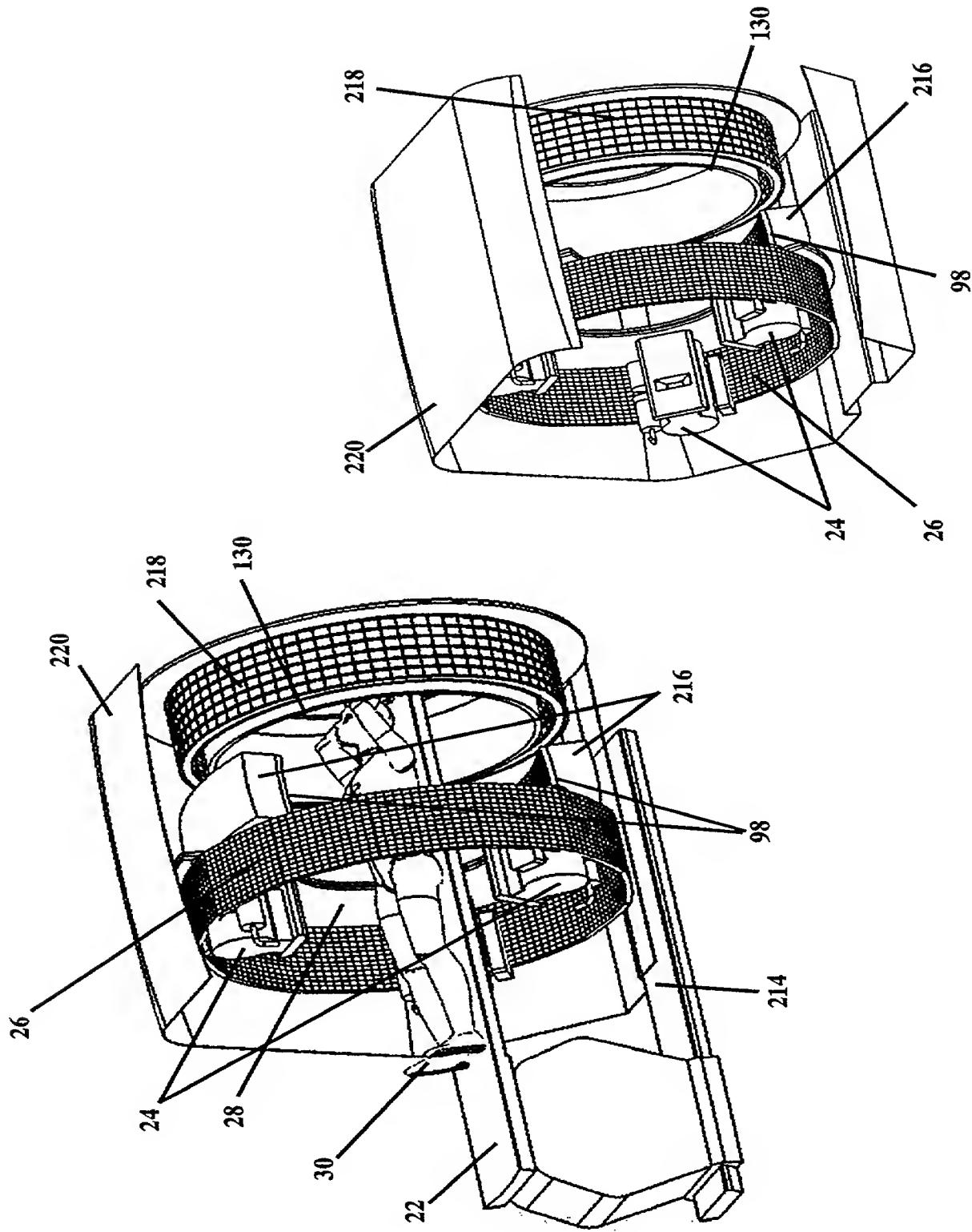


Figure 44

Multi-Modality Imaging with Common Gantry and Independent Single X-Ray 4th Generation VCT, PET, and NM/SPECT Image Acquisition System

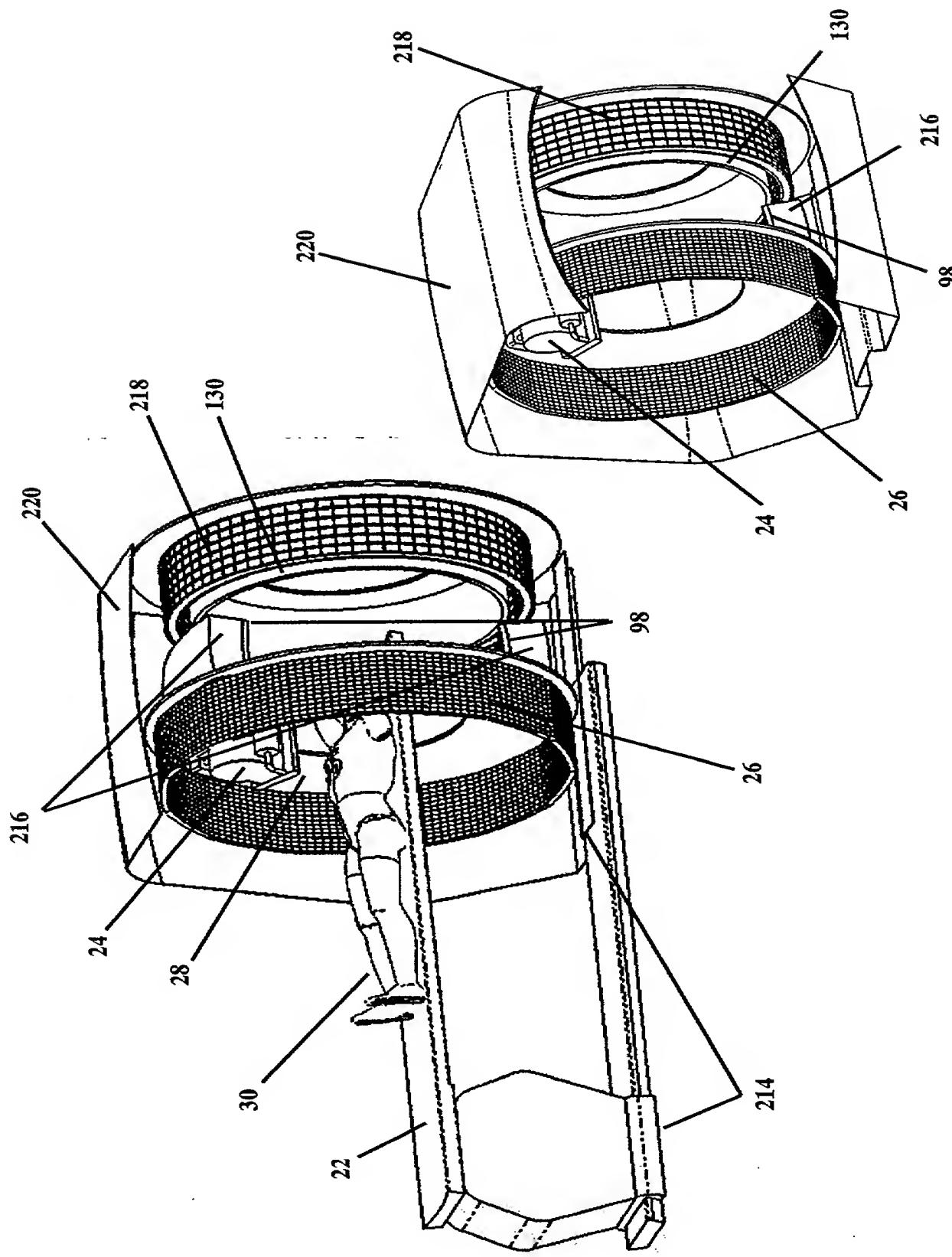


Figure 45